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COMMUNICATIONS

DERANGEMENT OF THE CORNEAL NERVES

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IN former times there used to be many disputes with regard to the possible existence of trophic fibres in nerves, but to-day it is generally supposed that there is no need to assume the presence of special trophic elements. All nerve fibres may be regarded as trophic. They are intimately concerned with the activity and preservation of the cells to which they are distributed, so that a cell deprived of its nerve supply is heavily handicapped. Moreover, an injured nerve cell often discharges abnormal impulses along its fibres, whereby the tissues suffer further harm. In certain clinical conditions it is impossible to be certain whether changes observed in the affected part are due mainly to the loss of normal controlling nervous impulses, or whether the damage is caused chiefly by active deleterious stimuli conveyed along nerve fibres.

The epithelial cells of the cornea are extremely sensitive towards any interference with their nerve supply, but most of the clinical evidence suggests that abnormal impulses derived from unhealthy nerve cells or nerve fibres are chiefly responsible. Thus the corneal nutrition hardly ever suffers as a result of cataract extraction—an operation which must for a time cut off many of the cells from their customary nervous control, however much overlapping there may be on the part of nerve fibres entering

from different points on the circumference. Then in herpes zoster ophthalmicus, although there is almost always loss or impairment of the corneal sensation, yet only a minority of the cases proceed to develop keratitis. Furthermore, neuro-paralytic keratitis is not unknown in patients whose corneal sensation is retained. For these and similar reasons one must conclude that mere severance of normal nervous connections does not as a rule provoke serious corneal lesions, although it can predispose to such lesions by abolishing protective reactions.

The nervous communications of the cornea become disordered not only in conditions that are primarily neural, but also in any form of acute corneal infiltration. In most cases of hypopyon ulcer, for example, the whole surface of the cornea is insensitive to touch. Similar anaesthesia can be observed in acute glaucoma. Verderame has correctly pointed out that the corneal nerves are rendered more easily visible as a result of various pathological processes. Thus, in a typical case of keratoconus, it is well known that the nerves of the cornea become abnormally distinct. In early cases of interstitial keratitis I have often been able to see the nerves clearly without the aid of a loupe. Among normal corneæ, however, the degree of visibility of the nerves varies within wide limits. Often they can be seen by focal illumination and the use of a loupe. In other people they are comparatively difficult to see, even on slit-lamp examination. They occur in the middle and superficial layers of the substantia propria. Having entered at the limbus, they approach the centre of the cornea in a radial direction, fading from view before the end of their course. They branch into two or three sub-divisions at an acute angle, and they look like strands of fine thread. At the present stage of development in slit-lamp technique, direct observations on the inter-epithelial nerve-plexuses of the living eye are not feasible. Therefore many problems concerning neuropathic keratitis remain unsolved.

In herpes zoster ophthalmicus the association of ocular lesions with damage to the Gasserian ganglion is established by repeated pathological investigations and experiments. Neuro-paralytic keratitis following operative interference with the ganglion provides another example of this association. In addition to these two conditions, however, there are several corneal disorders in which the clinical evidence indicates derangement of the nerve supply as an important factor in causation. It is proposed in this paper to discuss some of these disorders after making brief mention of the main features of neuro-paralytic keratitis. Herpes zoster ophthalmicus will be considered in a later paper.

The main characteristic of neuro-paralytic keratitis is an epithelial oedema, most intense in the centre, but to some extent

involving the whole surface of the cornea, and greatly varying in severity among different patients. At one end of the scale are cases showing rapid exfoliation. At the opposite extreme are those in which the epithelium displays minute vesicles for months or years without any demonstrable breach of surface. In these mild cases the oedematous cells or cell-groups are, as a rule, inconstant in size, as contrasted with the condition of uniform epithelial bedewing commonly found, *e.g.*, in acute glaucoma. If a breach occurs on the surface, the corneal substance is liable to undergo rapid destruction, thus producing hypopyon ulcer. Lid-suture performed as a prophylactic measure, or else at the first sign of epithelial loss, usually succeeds in preventing this disaster. In order to protect the cornea from deep ulceration, it is not necessary for the lid-suture to be complete. Cases have been recorded in which rapid healing has resulted from partial suture. Sometimes there has been an immediate recurrence of ulceration after division of a small outer bridge of lid-tissue, not enough to have screened the eye from contact with the air. No satisfactory hypothesis has been devised as an explanation for all the phenomena in neuro-paralytic keratitis, although much speculative ingenuity has been employed in trying to account for them. It seems clear, however, that there must be a peripheral as well as a central factor in the causation of neuro-paralytic ulceration of the cornea.

I recently examined a 56-year-old woman who complained that her right eye, and the right side of her face had never been normal since a mastoid operation performed fifteen years previously. A right-sided facial nerve palsy was present. There was anaesthesia of the right cornea, and of the skin supplied by the first and second divisions of the right trigeminal nerve. In the centre of the affected cornea were numerous pin-point, calcareous-looking opacities situated in the epithelial layer. The peripheral epithelium presented a multitude of flat vesicles inconstant in shape and size. I feel sure that the original condition of this cornea was that of epithelial oedema over its whole surface, and that the white dots represent degenerative changes supervening on long-continued oedema. I have been able to watch similar opacities replace epithelial vesicles in a case of chronic uveitis. In this connection it is interesting to remember that epithelial oedema is a preliminary stage in band-shaped keratitis. Calcareous changes may also follow prolonged oedema in cases of epithelial dystrophy of the cornea.

In herpes febrilis of the cornea the most distinctive feature is the presence of epithelial blebs, often disposed in a dendritic design, and surrounded by more finely-vesiculated epithelium. Some of the blebs are likely to rupture, so that their position is conspicuously displayed by fluorescein; but it will often be found

that the dendritic figure stains faintly with fluorescein before any visible epithelial loss has occurred, or even after the repair of a denuded area by fresh epithelium. Since the rest of the cornea may appear normal, and may retain its sensation, it is probable that the nerves involved are the inter-epithelial plexuses in localised areas. Theobald, however, believes that the ciliary ganglion is the seat of damage. Lesions in the Gasserian ganglion itself have been blamed by others. Wherever the fundamental trouble may be, herpes febrilis shows a strong tendency to recur. I have seen cases in which attacks have arisen several times a year for many years; in others there have been periods of several years' immunity intervening between attacks. Herpes febrilis may begin insidiously, presenting the appearance of an ordinary small, irritable ulcer, not at first manifesting the dendritic figure. In fresh attacks any portion of the cornea may be implicated, but there is a predilection for those areas which have already suffered. After numerous relapses it is not uncommon to see new vessels developing on the surface of the cornea, or in its deeper layers. In the case of a recently-examined man, aged 72 years, who had had six previous dendritic ulcers, there were numerous large blood-vessels in the lower half of the left cornea. These vessels, occupying the superficial layers near the limbus, became deeper as they approached the centre, until they came to lie immediately in front of Descemet's membrane. The right eye was normal.

Recurrent abrasion of the cornea should probably be added to the list of neuropathic affections. At the time of a fresh bout of symptoms the site of the original abrasion may be demonstrably flat and completely healed, while portions of epithelium elsewhere are vacuolated. The following case illustrates this point: In January, 1932, a woman, aged 32 years, flicked her left eye with a newspaper, causing an abrasion on the upper nasal portion of the cornea. Healing was established in less than a week. During the next three months she had about five attacks of sharp pain in the same eye, usually arising in the early morning. She returned to hospital, whereupon it was found that the area occupied by the original abrasion was undisturbed. Along the inferior portion of the cornea, however, was a series of epithelial vesicles, variable in shape and in size, situated close to the limbus. Corneal sensation was normal above, diminished at the centre, and absent below.

A patient who has provided a train of symptoms and signs exactly like those of recurrent abrasion may find himself unable to remember a preceding abrasion to account for the disturbance. In some cases of this kind the original abrasion may have been too remote or trivial to be remembered; but it is more likely that

the so-called recurrent abrasion of the cornea is a neuropathic condition characterised by loosely-attached epithelium. Trauma may then be regarded as a precipitating factor, not the essential cause. From the above descriptions it would appear that there is a fairly close affinity between the behaviour of herpes febrilis and that of recurrent abrasion. They have a further feature in common. Both these conditions can produce deep keratitis as a sequel. Epithelial denudation may allow the access of infective agents to the substantia propria, leading to deep infiltration, folds in Descemet's membrane, precipitates, posterior synechiae, and the reduction of vision to finger-counting.

In the miscellaneous collection of diseases grouped under the name of superficial punctate keratitis it is highly probable that some nervous lesion is frequently responsible. The onset is not uncommonly heralded by sharp neuralgic pains in the vicinity of the orbit. Sometimes the skin of the eyelids on the affected side is defective in sensibility to light touch. During epidemic visitations some of the patients proceed to develop keratitis profunda comparable to that which may arise in severe cases of herpes febrilis or recurrent abrasion.

During convalescence from influenza the cornea is liable to be affected by a variety of lesions, including dendritic ulcer, multiple erosions with or without vascularisation, and deep keratitis. Now the influenza organisms or toxins are prone to attack either the nervous system as a whole, so as to produce general debility, or individual peripheral nerves, *e.g.*, those that supply the ocular muscles. It is, therefore, not unlikely that the corneal lesions frequently seen after an attack of this disease are produced through the medium of the corneal nerve supply. During the 1918-19 world-epidemic Monbrun saw, among patients recovering from influenza, a number of cases which he described as neuroparalytic keratitis.

The corneal dystrophies are a group of rare, mysterious conditions, in which there is progressive interference with the nutrition of the cornea. Most of them are bilateral, and, with the exception of keratoconus, are associated with progressive diminution in the sensibility of the cornea, thereby suggesting the possibility of a neuropathic basis. Epithelial dystrophy of the cornea is a bilateral disease of elderly people, in which degenerative changes involving the corneal endothelium are the earliest sign. Progressive oedema of the epithelial cells marks the next stage, and is observed first in the centre, later in the periphery of the cornea. Sooner or later the substantia propria is affected. In the last stages the cornea becomes partially calcified. Admittedly the corneal anaesthesia associated with epithelial dystrophy may be due to degenerative changes spreading from

the cells of the epithelium to the fibres of the terminal nerve-plexuses. The possibility that the nerves are primarily affected is, however, strengthened by the occurrence of a similar epithelial disorder in myotonia atrophica, as reported by Maillard and Birnbacher.

Nodular keratitis is another form of bilateral dystrophy of the cornea accompanied by diminished sensation, and often affecting several members of the same family. The diversity of clinical and pathological findings tends to show that nodular keratitis is a term applicable to a series of different obscure conditions, and that it is not one definite disease. Alphabet and reticular keratitis may be regarded as members of the same group, in which the opacities are usually superficial, but may occupy any of the corneal layers. In the course of a discussion on this subject (*Proc. Roy. Soc. Med., Sect. Ophthal.*, Vol. XVI, p. 43, 1923) Neame mentioned a case which showed opacities in the middle layers of the substantia propria in both eyes: in the right eye they were of the linear type; in the left eye, nodular.

On the surface of eyes that have become blind from neglected glaucoma, a number of large epithelial bullae may be formed. Similar changes occasionally make their appearance in the corneae of people who have had no previous eye trouble, and show no evident cause for this degeneration. Attacks of irritability may arise from time to time after rupture of one or more bullae. Both eyes tend to be involved, and the largest of the bullae show a preference for the centre of the cornea, so that vision may be seriously impaired. Band-shaped keratitis resembles bullous keratitis in that it also exists in two main varieties. On the one hand there is the unilateral band-shaped opacity arising in a disorganised eye, *e.g.*, one that has long been blind from irido-cyclitis, The bilateral form, on the other hand, develops slowly and insidiously without any known cause. It is both preceded and accompanied by vesiculation of the epithelium, and may possibly be due to some derangement of the corneal nerve supply.

Marginal degeneration of the cornea is a slow destructive process which attacks the peripheral portion of the cornea around part or the whole of its circumference. This dystrophy attacks the middle-aged and elderly more often than the young, and is accompanied by progressive loss of sensation on the cornea. The affected regions show superficial vascularisation, and gradual diminution in the thickness of the substantia propria, leading first to gutter-formation, and later to localised ectasia. Rupture of the globe from the slightest of blows is a possible danger during the ectatic stage. Spontaneous rupture is not unknown. Both eyes are involved sooner or later.

Most of the disorders in which, for no evident reason, the

nutrition of the cornea declines, are associated with gradual diminution in the corneal sensation. To this rule keratoconus is an exception, for it is commonly accompanied by hyperaesthesia, which suggests that the increased visibility of the corneal nerves in this condition is an expression of their actual hypertrophy. Conical cornea is more often seen in women than in men. The last case I saw was that of a married woman, aged 36 years, who had been bedridden for several years, and was in a state of general weakness. I have, however, seen several examples of it in young, healthy, unmarried women, in whom the cause remained a mystery. Löwenstein believed that pregnancy accelerates the progress of this disorder. He also reported the interesting case of an elderly woman who developed keratoconus in her right eye six weeks after a right-sided partial thyroidectomy. Fourteen years later the condition remained unilateral, thereby leading him to believe that it was the result of injury to the cervical sympathetic nerve during the operation. On the other hand, I know of no case in which the ordinary form of birth-injury to this nerve has been associated with the development of a conical cornea. A different type of corneal lesion accompanying thyroid disorder was described by Treacher Collins. A woman, aged 58 years, suffering from myxoedema, gave a history of six months' haloes and failing vision in the left eye. On examination he found a number of small, superficial, discrete grey dots in the centre of the left cornea. Vision was reduced to 6/36, but recovered to 6/6 when the opacities had been dispersed by a course of thyroid extract.

In conclusion I would suggest that, epithelial oedema being the most characteristic early sign of disordered corneal nerve supply, it is necessary to consider the possibility of a nervous lesion in cases which persistently show this sign without any rise of ocular tension, and in the absence of any obvious traumatic or inflammatory cause.

My sincere thanks are due to the Moorfields surgeons, who have granted me every facility of access to the patients under their care.

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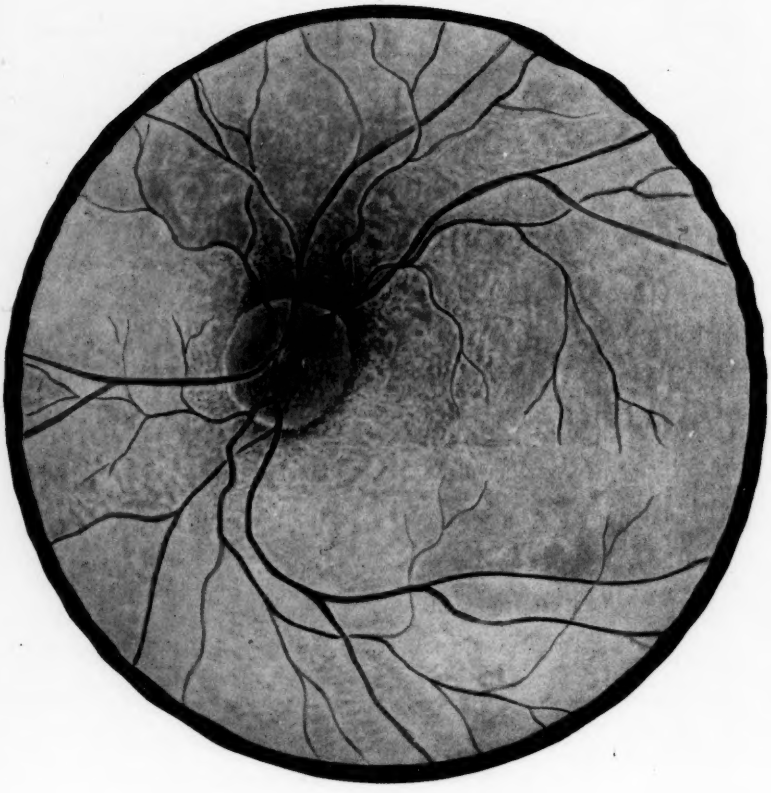

THE RETINA IN HAEMOCHROMATOSIS

BY

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HAEMOCHROMATOSIS consists of an extraordinary derangement of liver and possibly pancreatic metabolism, whereby excessive deposits of iron and copper are laid down in almost all organs and tissues, including the ectodermal structures. Enlargement of the liver, associated with a fine type of biliary cirrhosis occurs, and also an interstitial fibrosis of the pancreas. In consequence of these changes, a clinical picture is produced of diabetes mellitus, accompanied by a slaty-blue discolouration of the skin, prompting the appellation, "diabète bronzé."

The pigmentation prefers certain skin areas, such as those exposed to light. The mucous membranes are usually said to be uncoloured. In a search of the available literature I have been unable to find any reference to retinal pigmentation. In the course of a study of four examples of this disease from another point of view, the fundi were carefully examined through the dilated pupil. In all four patients, retinal pigmentary changes of varying degree were discovered, of a special character now to be described.

The pigment deposition was of a diffuse and uniform character, but was especially concentrated around some or all of the disc margin. The edge of the disc, therefore, appeared exceptionally sharply cut, owing to the colour contrast. This intensity of darkness was maintained through a radius of 3 or 4 mm. towards the periphery, and then commenced to fade and assume the normal hue of a "tigroid" fundus. The pigment itself was not the common jet black colour seen in dark skinned races or brunettes, but a deep slaty-blue colour, through which the retina appeared as a kind of ochre background. The artist (see Fig.) has not quite caught the exact shade, and has made the disc itself too purplish, whereas it really displayed its normal light pink. The illustration is from the patient with these changes least advanced, as he made the best "sitter."

These appearances varied directly in depth as the skin changes, as far as this small series of patients is concerned, of whom none had any special degree of natural pigmentation. In fact, the one (a woman) with the darkest fundus had the lightest shade of hair. None had any great degree of refractive error.

Of the nature of the pigment, one can only surmise that it is haemofuscin, identical with that of the cutis externa, since, so far, I have not been able to obtain autopsy material. The mucous mem-

branes usually remain uncoloured, while the ectodermal tissues, skin and retina are pigmented. It is highly probable that the rare unpigmented examples of haemochromatosis have retinae of normal aspect.

As regards the remaining features of the fundus, a little scattered irregularity of the arterial lumen was apparent in one patient. None of the other components of a diabetic retinitis were seen in these or other reported sufferers. The carbohydrate disturbance is here of a different order from that of idiopathic diabetes mellitus. The disorder is usually diagnosed at a late stage, and milder cases can readily pass unnoticed under the clinician's eyes, especially in a sunny country, so it may happen that the oculist may be able to add one more to the list of diseases first recognised through the ophthalmoscope.

I am grateful to Professor Lambie for defraying the artist's fee from funds of the Department of Medicine, University of Sydney.

THE PRIMARY POSITION OF THE EYES

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THE purpose of this paper is to show that the conception of the Primary Position of the Eyes, as described in text-books, is wrong.

Duke-Elder[1] states:

> "When the eyes are looking straight in front, with the head vertical, with the visual axes parallel, and the vertical meridians of the two corneae both vertical and parallel, they are said to be in the PRIMARY POSITION."

Yet every thinking person must realise that when the eyes are looking—straight ahead or elsewhere—the visual axes are *not* parallel, but convergent. Therefore, in physiological ophthalmology it cannot be admitted that the visual axes of the *looking* eyes ever are parallel.

Perhaps no objection should be raised against this definition of the visual axes as parallel, if it is done arbitrarily in order to explain something. But then it is necessary that the description of the *true* physiological state should follow, in order to correct the wrong impression caused by so arbitrary a statement. The above text-book[2], however, goes on:

> "This forms the basis of the physiological definition of the primary position of the eyes."

It will readily be agreed that ***the anatomical position is the real primary position***, and I shall attempt to show later what this is.

Sherrington[3] writes concerning the ocular position:

> "I have myself worked chiefly with the monkey. In that animal the ocular axes are parallel, and the setting of the eyeball in the orbit is such that the tensions of its connections, apart from unequal activity of its extrinsic muscles, are in equilibrium when the globes are approximately parallel. That is the primary position . . . If one eyeball be then rotated by the finger or fixation forceps to right or left, or up and down, a considerable resistance is felt, and on letting it go, the globus springs back at once to the primary position. So also in chloroformisation . . . So also immediately after death, before rigor mortis has set in."

Now I would like to draw attention to the fact that in man the position in ophthalmoplegia, in anaesthesia and in death, is ***not parallel, but divergent.***

Duke-Elder's[4] text-book states in this connection:

> "In total ophthalmoplegia the eyes rarely look straight ahead in a parallel direction, but usually diverge slightly, and very exceptionally converge; the same orientation tends to be assumed immediately after death (v. Graefe, 1867; Grut, 1894; Oppenheim, 1905; Roelofs, 1914)."

Worth[5] states concerning the position:

> "In the case of a normal pair of eyes there is no such thing as ***static convergence*** . . ."

Apart from the consideration of what is the actual Primary Position of the eyes, it appears to be insufficiently realised that the anatomical position is one of stable equilibrium and ***perfect elasticity***. It is this which causes "considerable resistance" whenever the eye is rotated away from it. The notion that the eye moves in its orbital bed, like, ***e.g.***, the caput femoris in its socket, is wrong; yet it exercises great influence on the theories of binocular and ocular motility.

Investigation of the Primary Position

I have tested the elasticity of the Primary Position. The tests were made on three baboons (28, 29 and 30 lbs.) and on two monkeys (22 and 25 lbs.), all young healthy females.

The tests were made, first in deep general anaesthesia, and then again after death caused by the anaesthetic. Two loops of silk 00 were brought through the episcleral tissue near the limbus, one at the temporal side and one at the nasal side. By pulling on these loops the eyes could be rotated. The measurement of the tangential displacement of these rotations was taken in millimetres. The

force needed for these displacements was recorded by a calibrated spring.

The results of the experiments were:

(1) After each displacement the eye returned to the primary position;

(2) The force needed for each tangential displacement stood in direct and constant proportion to the degree of the displacement;

(3) After death less force was needed, but results 1 and 2 were not affected.

Conclusions:—All this can only be explained by a condition of perfect elasticity.

TEST ON MONKEY (25 lbs.)

Right Eye in Anaesthesia.	Tangential Displacement. Millimetres.	Force in Grammes.	Right Eye in Death.	Tangential Displacement. Millimetres.	Force in Grammes.
Movement Inwards	1	1·6	Movement Inwards	1	1·2
	2	3·2		2	2·45
	3	5·5		3	4
	4	7		4	5·85
Movement Outwards	1	1·65	Movement Outwards	1	1·65
	2	3·1		2	2·3
	3	5·1		3	3·6
	4	8		4	5

Left Eye in Anaesthesia.	Tangential Displacement. Millimetres.	Force in Grammes.	Left Eye in Death.	Tangential Displacement. Millimetres.	Force in Grammes.
Movement Inwards	1	2	Movement Inwards	1	1
	2	3·95		2	2
	3	6		3	3
	4	8		4	4
Movement Outwards	1	2	Movement Inwards	1	0·8
	2	4		2	1·8
	3	6·15		3	2·85
	4	8		4	5

The above are typical of the results obtained with all the animals tested by this method.

This perfect elasticity is the elasticity of the anatomical structures which fix the eyeball.

Sutton[6] writes:

> "Many modern texts hold that the fascia bulbi forms a socket in which the globe of the eye may rotate. After a consideration of the attachments of the fascia, it is difficult to conceive of much rotation taking place.
>
> ". . . In certain regions of the orbital septum there are to be found local thickenings of the fascia, which are known as check ligaments. Stretching, as they do, from the external surfaces of the muscles to the margin of the bony orbit, they limit to a certain degree the movements of the eyeball.
>
> ". . . In an examination of the lines of reflexion of the fascia, and a consideration of the investment of the muscles as cones of fascia, it is seen that neither the muscles nor their tendons pierce the fascia bulbi.
>
> ". . . Of the two check ligaments, the lateral or external is the better developed. . . . There is no sharp line of demarcation between these thickenings and the adjoining parts of the orbital septum. Each becomes thinner towards the edge and finally fades out in the fascia. The predominating fibres are, according to Lockwood, elastic. Of the two ligaments, the medial contains the greater proportion of elastic fibres (Motais).
>
> ". . . The space beneath the fascia bulbi is known as space of Tenon, or the supra-scleral lymph space of Schwalbe. Extending vertically and obliquely across this space are found delicate connective tissue fibres."

The difference between these conditions and those of ordinary articulations is obvious. When its muscles are paralysed, a limb gravitates towards any position the capsule allows. When its extrinsic muscles are paralysed, the eyeball offers considerable resistance to attempts at rotation, and springs back at once to the primary position when released.

And so the anatomical position of elastic slight divergence becomes the *Primary Position* of all binocular movements and subsequent positions.

The Secondary Positions

Tonic reflexes bring about preparedness for action. Sherrington[7] writes:

> "One great function of the tonic reflexes is to maintain habitual attitudes and postures. They form, therefore, a nervous background of active equilibrium. It is of obvious advantage that this equilibrium should be easily upset, so that the animal may respond agilely to the passing events that break upon it as intercurrent stimuli . . .

> "Of all reflexes, it is the tonic reflexes, *e.g.*, of ordinary posture, that are in my experience the most ***easily*** interrupted by other reflexes."

The primary position of the eye is by tonic muscular action changed into a postural position or habitual attitude, in order to be ready for function. This secondary position could be called *Phoria*. It varies in response to consciousness, rest and function. Individuals vary in their phoria. The fullest readiness is orthophoria; all other conditions of phoria are called heterophoria. Concerning orthophoria, Hofmann[8] writes:

> "***Nach den Untersuchungen von Bielschowsky und anderen ist strenge Orthophorie nur eine seltene Ausnahme, gewissermassen ein schematischer Grenzfall.***"

Duke-Elder[9] states:

> "Orthophoria . . . is extremely rare. Almost invariably a certain amount of imbalance or heterophoria exists."

The usual and normal condition therefore is heterophoria. Abnormality begins when heterophoria causes eyestrain.

As against the Primary Position, which is stable, passive, elastic equilibrium, Phoria is active equilibrium, "most easily interrupted by other reflexes," so that the organ "may respond agilely to passing events that break upon it as intercurrent stimuli."

In the Primary Position the visual axes have an angle, open towards the front. Phoria decreases that angle, eventually converting it into an angle open towards the back. Consequently the tonic action resulting in Phoria is regularly produced by the *adductor* muscles.

The Significance of the Primary Position

The words "muscle balance" and "muscle imbalance" are typical of the misconceived Primary Position.

My claim is that ***the extrinsic muscles of the eyes are tensors.*** They rotate the globus away from the Primary Position, and by inhibition allow that rotation to be reversed towards the Primary Position. The power for the reversed movement is supplied by the elasticity of that position, the regulation of time and step of the reversed movement is done by inhibition.

To illustrate this I quote Sherrington's[10] remarks and experiments. (The italics in this quotation are mine.)

> "If III and IV cranial nerves of one side, *e.g.*, left, have been severed, so that rectus externus remains the only unparalysed ocular muscle, appropriate excitation of the cortex cerebri produces conjugate movement of both eyes towards the opposite side, *i.e.*, from left toward right, the left eye travelling however only so far as the median line. Inhibition of the

tonus and of the active contraction of rectus externus can thus be elicited from the cortex. . . .

"E. H. Hering and myself made observations on limb movements . . . For clearness of description let us suppose the left hemisphere excited, and the limb affected the right. The result of excitation of the appropriate focus in the cortex *e.g.*, that presiding over extension of the elbow, is an immediate relaxation of the biceps, with active contraction of the triceps. . . . As regards the condition of the biceps, the relaxation is usually so striking that merely to place the finger on it is enough to convince the observer that the muscle relaxes. . . .

". . . it may well be, indeed is in the highest degree likely, that in other fields of action one cortical element inhibits another cortical element.

"In 'willed' movements of the eyeballs of the monkey the same kind of co-ordination was revealed in some observations I obtained on this point. When the III and IV cranial nerves had been resected intra-cranially and the animals in ten days or so had recovered completely from the surgical interference, the eye movements were examined.

"In these animals if the gaze was attracted to an object, *e.g.*, food, held level with the eyes and to the right of the median plane (left III and IV nerves cut) the left eye looked straight forward, the right eye looked to the right. If the object was then shifted more to the right or less to the right, the right eye followed it, moving as the object was moved, while the left eye remained motionless, looking straight forward all the time. But when the object was held to the left of the median plane, both eyes were directed upon it, apparently quite accurately. When the object was shifted farther and farther to the left both eyes followed it with a steady conjugate movement not detectably different from the normal. When the object was carried from the left-hand verge of the field back towards the median plane ***both eyes followed it*** as ***accurately*** as before. If the object was moved suddenly from the extreme left-hand edge of the field up to the median plane ***both eyes immediately*** and apparently ***equally quickly reverted*** to parallelism with that plane. Or, if the object were suddenly brought back from the left edge of the visual field to some point intermediate between that and the median plane ***both eyes at once shifted*** apparently ***equally*** to a correspondingly diminished deviation from the primary position. These actions must mean that in the left eye relaxation of rectus externus kept accurate time and step with contraction of the rectus externus of right eye. And the action of the left rectus externus gives presumably a faithful picture of a synchronous process going forward in the right rectus internus."

From Sherrington's experiments it is clear that, as against what happens in a limb, the "antagonist" plays a passive rôle in most, if not all, ocular and binocular movements. This new conception drawn by me from Sherrington's classical experiments on inhibition should have far reaching effects on the theories of ocular, and especially binocular, motility.

Sherrington's experiments on inhibition offer a problem which can now be solved. It will have been noted that when the rectus internus is paralysed the globe can rotate, by cortical excitation, from the extreme external position to the median plane. What Sherrington means by "median plane" really is "anatomical—or primary—position." Of course this movement cannot be *caused* by inhibition. Inhibition can never be a *motive force.* I wish to point out that it is the elasticity of the primary position that does the work. The *inhibition only regulates* the effect of the traction continually exercised by the elasticity of the primary position. As, presumably, the law of inhibition applies equally to all extrinsic eye movement, it follows that any movement from the primary position towards the edge of the fixation field, *and* reversal of the movement from that edge towards the primary position, are both actuated by the same muscle. The movement away from the primary position is produced by contraction; the movement towards the primary position by inhibition of the muscle. The elasticity of the Primary Position is *continually* in action, whenever the eye is rotated out of it. During adduction, for instance, it is a *counteracting* power, which has to be overcome; during abduction from the internal edge of the fixation field up to the primary position it is the *acting* power whose time and step are regulated by inhibition of the *adductor* muscle.

For these reasons the term "muscle-balance" is based on a wrong conception. In extrinsic ocular movement there exists no balance between opposite muscular action. What there is of balance has to do with *equilibrium between the traction of the primary position and extrinsic muscular action.* Phoria is the result of this equilibrium. The equilibrium may be sufficient or insufficient for proper function. When it is sufficient, then the best possible posture, or habitual attitude, preparatory for binocular visual function is established.

Summary

As against the traditional arbitrary method of defining a "primary position" of the bi-unial eye, the real PRIMARY POSITION is recognised, viz.: *the anatomical position* of the organ. This position is the basis of kinetic binocular ophthalmology.

This anatomical position is one of *divergence* of the visual axes.

The globes are firmly fixed in their orbital beds by connective tissue, ligaments and strands which all contain a strong quota of *elastic* elements. The result of this anatomical condition is: a *stable equilibrium* and an elasticity *exercising permanent influence* on motions and positions of the organ.

Phoria is the name for all secondary positions. These are characterised by variation and instability.

From the *stable, and elastic,* equilibrium of the primary position the nature of ocular motility is considered.

A new conception of ocular motility is proposed.

The extrinsic muscles act as tensors between the primary position and the edge of the fixation field. They act by contraction in the direction away from the primary position. *In the direction towards the primary position they act by inhibition only.* Muscular contraction is never required for any movement towards the primary position.

The system of *muscular* antagonistic action which dominates movements of arms and legs is absent in extrinsic ocular movement. Its place is taken by a system of reciprocal action between extrinsic muscular power and the power of elasticity of the Primary Position.

The current expressions: "muscle-balance" and "muscle-imbalance" are based on a wrong conception of anatomical and physiological facts, in so far as they relate to the eyes.

I desire here to acknowledge with gratitude the interest shown, and practical help given, in my work by Professor Raymond A. Dart, Sir Spencer Lister and Professor A. D. Stammers.

My thanks are also due to Mr. R. L. Caunter for his assistance in the investigations on the animals.

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AUTOMATIC REGULATION OF HEATING IN ELECTRICAL HOT AIR STERILIZATION OF SURGICAL EYE INSTRUMENTS AND SILKS FOR SUTURE*

BY

S. HOLTH

OSLO, NORWAY

THE ordinary boiling in water or in a two per cent. alkaline solution of sodium carbonate must be done immediately before each operation, but, nevertheless, spoils the edge of instruments made of the good old steel, and also of those made from the best non-corrosive steel. In the later catalogues from factories making surgical instruments, one will find all kinds of pincers, and likewise coarser scalpels and scissors made of non-corrosive steel, and also obstetrical instruments. Hypodermic needles are made of this material; they can tolerate a short heating in the flame. Cutting instruments for operations on the eye in rust-proof steel, which were announced ten years ago, are not seen in the catalogues —a single one, however, excepted.

Professor Johan Hjort (Oslo), in 1898, instructed his assistant to hold the cataract knife in boiling water one minute to spare the edge. The same procedure is adhered to until this day in the large Eye Clinics in London, only with the difference that the knife first is rinsed for one minute in absolute alcohol or in acidum carbolicum liquefactum.

In a lesson during the spring of 1899, E. Roux in the Pasteur Institute in Paris said that boiling once for 30 minutes kills all sporeless bacteria, but not the spores of the spore-bearing bacteria. The latter were first killed after an uninterrupted boiling of from two to five hours duration or through interrupted boiling for three days, 15 minutes every day with complete cooling between boiling. Young spores cultures—air-dried at ordinary room temperature—were, however, killed in a single heating in dry air at a temperature of 150° C. I, myself, could control this fact with spores from anthrax, tetanus and bacillus subtilis. At the same time I could show that excellent cataract knives and keratomes, from A. Luër in Paris, after heating had an edge and a point as sharp as if they had just arrived from the instrument maker.

The firm, E. Adnet et Cie, had made the gas heated double-mantled air ovens of copper. In January, 1900, I obtained a specimen of this oven for the University Eye Clinic and another

* Read in the Norwegian Medical Society, December 21, 1932.

for the Catholic Hospital of Oslo. In a perforated stopper in the top of the oven a thermometer was introduced, measuring from 50° to 200° C. As soon as the temperature had reached 150° C. the gas burner had to be slightly closed, if the temperature showed any tendency to rise, and opened if it should start falling. This half-hour's watch over the thermometer was carefully carried out by the attendants of both hospitals. It had to be continued also after the introduction several years ago of the electrically heated ovens of Lautenschläger with periodical breaking and closing of the current under close observation of the thermometer.

As far back as January, 1901, the instrument maker, Moritz Gallus, lamented the strongly declining sharpenings of used cataract knives from the University Eye Clinic and the small sale of new ones, a fact I held to be a practical compliment to the introduction of the dry air sterilization, which successively has been adopted almost exclusively by all operators in the Catholic Hospital in Oslo. For this sterilization the instruments are placed closely together in dry metal cases and should be packed in two layers of filtering paper. During the operation the instruments are placed more conveniently on two dry towels, sterilized in the autoclave. Instruments should not be put into any kind of fluid during the operation. If an eye instrument must be used a second time during the same operation, it should first be rinsed in absolutely sterile water; it is better to have four dry sterilized iris spatulae in the case. One should, for the dry air sterilization, have at least two larger metal cases for typical operations, and at least one smaller metal case for each of the less frequently used special instruments. When the double layer of filtering paper is removed from the case, the sterile instruments are ready for use at any time.

All known *pathogenic* bacterial *spores* are killed at 150° C. within 30 minutes. But there are microbes from dust and soil with spores that are killed only in temperatures of 160° C. After having convinced myself that the finest cutting instruments of the old instrument steel were unstained after 30 minutes heating of dry air at 160°—165° C., and that their edge and point were as sharp as immediately after sharpening, I asked Dr. med. Th. Thjötta to try this temperature upon the most hardy bacteria spores obtainable.

He chose bacillus mesentericus (Flügge). Thjötta now infected a number of sewing needles and silks with cultures of this microbe, adding to the culture some starch for better adhesion to the smooth surface of the needles. All material was dried in the open air before being enclosed in sterile test tubes plugged with common cotton plugs. Next all tubes were put in the dry air sterilizer and heated for 30 minutes at 160° C. This treatment killed all

spores in the tests, as shown by the fact that the plain broth pipetted into the tubes with needles and silks remained sterile for six days in the incubator, while the controls (not heated) gave a good growth.

Beforehand, I found it rather plausible that the silks might be somewhat weakened by 160° C. and had accordingly first stated that each silken thread had the same strength all through its length. This was done by the use of spring balances (trout balance for the slender conjunctival silk, salmon balance for the heavier skin silks) thus measuring the bursting point of the thread. I was very glad to find that the silks were not weakened by the temperature of 160°—165° C. It even happened that some threads after treatment were harder and stronger, as shown by the fact that the weight sometimes had to be increased about 20 per cent. of the original weight, before the bursting point was reached. Chinese female hairs occasionally used for sutures in the conjunctiva could not be tested after this method as the strength of the hair always differs in different parts of its length. Suitable lengths of silken thread with one or two suture needles fixed to them are enclosed in double filtering paper, are thus sterilized without the points of the needles being blunted—they are ready for use at any time.

The sterilization was carried out by Thjötta in the bacteriological laboratory of the Norwegian Army by means of the dry air sterilizer of W. C. Heraeus (Hanau a. Main) supplied with the auto-regulator for temperatures between +50° C. and +220° C., patented for this firm three years ago. The firm had taken out a patent January 30, 1913, for a thermoregulator for 70° C. (three days "Tyndallising procedure"). The constructions regarding higher temperatures began four years ago.

To spare the nurses from the tiring work of watching the mercury thermometer during the sterilization, I asked "Vor Frue Hospital" in June, 1932, to procure the thermoregulator mentioned above and to combine it with the electrically heated hot air sterilizer of Lautenschläger (double walled copper built). This was immediately done. It was mounted in August, and works well.

The whole arrangement from W. C. Heraeus is seen in Fig. 1. A double walled oven is made of aluminium with sheets of asbestos between the two layers of metal. The oven has three boards, where the instrument cases (each wrapped in double filtering paper) can be placed.

Uppermost in the oven is the *contact thermometer;* this is a ***bi-metal tube***. The lever connection between this one and the thermoscale to the right, cannot be seen on the picture. The hand of the scale can be placed on any of the radial lines between +50° and +220° C. to the extreme right. Above the oven the very

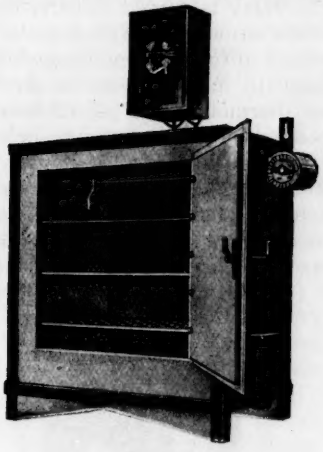

FIG. 1.

Electrically heated dry air sterilizer with *contact thermometer* and *mercurial relay* from W. C. Heraeus.

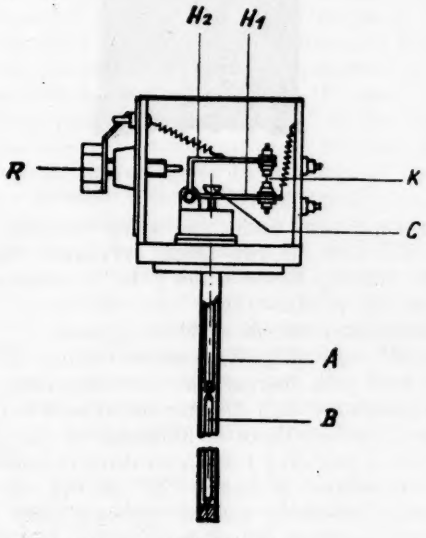

FIG. 2.

Diagram to explain the contact thermometer of W. C. Heraeus.

important *mercurial relay* is placed (details in Fig. 3). Further, a common mercurial thermometer with a scale ranging from +50° to +200° C. is placed through a perforated stopper in the roof of the oven (not seen in the picture). In the hot air sterilizer of Lautenschläger the thermometer is placed before the copper door and the metal protected mercury-container behind the door within the oven.

In Fig. 2 is seen a diagram showing the principle of the contact thermometer, which is made out of two metals.

It consists of an outer metal tube "A," with a large expansion under increasing temperature and an inner "invar" rod "B" with

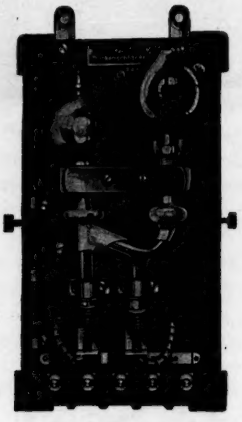

FIG. 3.

The *mercurial relay* of W. C. Heraeus.

a very slight expansion under the same temperature. Further, the contact "K" and the two levers, H1 and H2, will be seen together with the regulation screw "R," corresponding to the thermoscale in Fig. 1. The "invar" rod "B" ends with an enlargement and goes through the lever H1 in a groove.

The *mercurial relay* (Fig. 3) consists mainly of a container of quartz glass with pure mercury as the connecting medium; the main current passes through this mercurial switch to the apparatus to be heated. Further, there is mounted on the relay contacts, a resistance and a so-called heat-lamp directly connected with the switch. This heat-lamp is named "H" in Fig. 3.

The automatic breaking of the current takes place through a secondary current that is led through the resistance and from this to the heat-lamp "H." The switch is also filled with gas, which is warmed and drives the mercury to the left. Thus connection is obtained, and the current passes to the oven.

The Course of the Regulation

We will suppose that all parts are mounted and the contact in place. When the regulation screw (Fig. 1) is turned completely over to the left there is no contact at "K" (Fig. 2) and accordingly the current is broken in the mercurial switch. Consequently no current passes to the oven. If, however, the regulating screw is turned to the right, *e.g.*, to the line for 150° C. the lever H2 (Fig. 2) is pushed against lever H1 and the contact is closed for the secondary current. This current passes through the relay (Fig. 3), heats the gas in the switch, the mercury is pressed over to the left and the main current is closed. As the temperature rises, the metal tube "A" in the contact thermometer (Fig. 2) will expand several times as much as the expansion of the "invar" rod "B." As this proceeds, the "invar" rod draws the lever H1 back and the connection will be broken at "K." Consequently, the secondary current is broken. The heat-lamp "H" in the relay will cool down. The mercury is drawn over to the right and the main current is broken. When the oven cools down 0·5° to 1° C. the contact at "K" (Fig. 2) is closed again. The secondary current closes the main current, and the temperature of the oven is regulated.

Regarding the thermoregulator forwarded to "Vor Frue Hospital," W. C. Heraeus recommended that the hand of the contact-thermometer scale be placed at the point for 150° C. to obtain a temperature of 160° C. at the mercury thermometer and not exceed this temperature. This temperature is, however, not reached till several hours after starting. To spare time, the hand is therefore first placed completely over to the right (220° C.). 162° C. at the mercury thermometer is reached after 1·5 hours (somewhat variable according to the number of instrument cases in the oven). At that time the nurse must watch the scale of the mercury thermometer at the oven closely and when 162° C. is reached, she turns the hand down to 152° C. on the contact-thermometer scale. During the first 15 minutes the temperature rises to 165° C. without the slightest harm to the instruments. During the following 15 minutes the temperature varies between 161° and 163° C. without any interference. The sterilization is finished, the wall contact is drawn out, the door of the oven is opened. The hand on the contact thermometer scale remains at 152° C. until the next sterilization, when the operation again is started at 220° C.

The automatic thermo-regulator of W. C. Heraeus is only suited for electrical heating; alternating or direct current is indifferent. But the voltage (110 or 220) must be known. Further, one must obtain from the factory any information about the point of the scale of the contact-thermometer where the hand should be placed

to keep the temperature between 160° and 165° C. in every individual oven.

I hope that this addition to the absolutely sure French dry air sterilization may contribute to a well-merited further use of this method, both by general surgeons and by eye operators; especially for the latter, as the sharp point and edge are of the highest importance.

I wish to acknowledge my indebtedness to Dr. Th. Thjötta, who has undertaken all bacteriological controls mentioned in this paper and also called my attention to the automatic thermo-regulation of Heraeus, which caused me to attach this to the electrically heated dry air sterilizor of Lautenschläger.

The agent in England for W. C. Heraeus, Hanau a. Main, is: The Scientific Glass-Blowing Company, 12/14, Wright Street, Oxford Road, Manchester.

THE IDENTITY OF CATARACT FORMATIONS

BY

J. FOSTER, F.R.C.S.

LEEDS

THERE are still ophthalmologists in this country who prefer to use a loupe when a slit-lamp is available; possibly because they consider a loupe can reveal anything worth seeing, or possibly because of the large amount of confusing details the slit-lamp brings to light. A well used loupe may compete clinically, to a certain extent, with the slit-lamp so far as the anterior chamber is concerned, but for the lens the latter is incontestably superior. In this paper I have, therefore, made an attempt by pruning detail, and stressing practical points, to give a working classification of the types of cataract, and their appearance, as seen with the slit-lamp. Nothing new is offered, and almost all the facts can be found in greater detail and different arrangement in Goulden's translation of Koby's "Slit-lamp Microscopy of the Living Eye."

Since the cause of a cataract is frequently a matter of the utmost interest from the prognostic, operative, or medico-legal aspect, the analysis of an otherwise amorphous lens opacity by the slit-lamp beam is often a source of great satisfaction to the observer.

As the slit-lamp beam shines through the lens, attention must be paid, not only to the shape of the opacities, but also to the so-called "bands," and the zones of specular reflection. The former stand out as bright lines in the beam (drawn dark in Fig. 1) where areas of different refractive index, formed at different life stages, are in contact, and two Y-shaped figures are our marking

for the limit of the foetal nucleus, though there may be seen outside this a less well marked peripheral band which shows the outer limit. The zones of specular reflection are the areas where light is reflected from the anterior and posterior surfaces of the lens as from a mirror. They are inspected for the presence or absence of polychromatic lustre. This, when present, looks like a shiny area of a map of England with different coloured counties side by side. An illustration better than any description, is obtained by inspecting the area of reflection from the posterior lens capsule of an aphakic eye prior to capsulotomy.

These optical phenomena are an additional help in identifying the age and cause of any cataract.

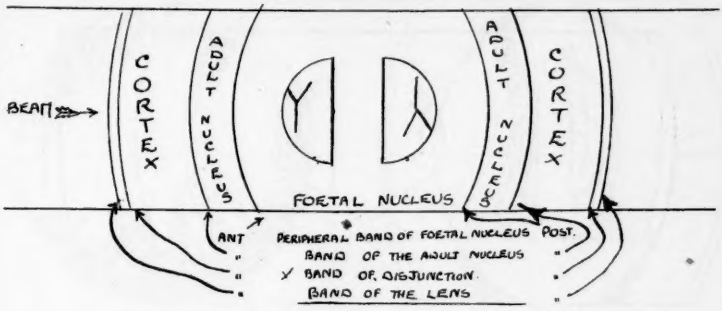

FIG. 1. *Based on the conventional adult lens of Vogt.*

Classification

(*a*) CONGENITAL	1.	*"Kalk" type*	Anterior or posterior polar.
	2.	*Punctate type.*	
(*b*) ACQUIRED	1.	*Presenile*	Coronary. "Water-spaces."
	2.	*Senile*	Nuclear. Cuneiform. Cupuliform. Dust-like in concentric layers.
	3.	*Complicated*	Uveal or retinal disease.
	4.	*Caloric*	"Heat-workers."
	5.	*Traumatic*	Indirect and direct violence.
	6.	*Glandular Dyscrazia*	Subcapsular—Diabetes. Cortical—other diseases.

(*a*) *Congenital Cataracts.* Are roughly divisible into two types. (1) The anterior and posterior polar, which are solid, chalk-white opacities, usually axial in situation. Occasionally, these exhibit a collar-stud shape due to re-duplication produced by the growth of the lens. Where the anterior polar opacities are very superficial, the cause is probably foetal iritis; this is borne out by strands running, in some cases, from the iris collarette to the opacity. The posterior polar opacities are usually due to hyaloid vascular anomalies. (2) The punctate variety. These tiny, regular spaced white dots (Fig. 2), are the units into which the pattern of a lamellar or other central congenital cataract resolves when subjected to a magnification of ×23. If truly congenital, they are

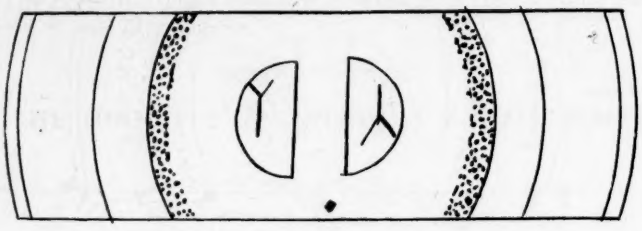

FIG. 2.

limited to the foetal nucleus and are usually concentrated at the zone marking its surface. Part of some lamellar cataracts arise after birth and are outside this limit. There are, of course, in addition, many other forms of congenital cataract differing in shape and arrangement from the above, but the majority are variants on these themes. Those given are the most important clinically, because the commonest.

(*b*) *Acquired Cataracts.* Senile and pre-senile opacities can be considered together as they frequently co-exist. Nuclear cataract is probably the commonest of the senile varieties over, and cuneiform under 65 years of age, but no one has yet worked out the relative incidence. Nuclear and cuneiform or cupuliform cataracts frequently co-exist.

In all adults over 60 years of age the lens between the bands of the adult nucleus becomes more yellowly luminous in the slit-lamp beam. This process is distinguished from nuclear cataract only in the matter of degree. Cuneiform cataract presents a familiar picture with the ophthalmoscope mirror of black spikes "aimed" at the axis of the lens. These opacities are in the cortex superficial to the adult nucleus. Water clefts, which appear at about 50 years of age, are of the same shape and situation, but can

be seen to be transparent, with ophthalmoscope mirror and slit-lamp.

Coronary opacities are round, ring, or club-shaped, but the apices of the clubs are directed away from the axis of the lens. The opacities may be brown or blue in colour (blue-dot cataract), and are situated mainly in the periphery of the adult nucleus and, to a lesser extent, in the deep cortex (Fig. 3). They occur in about 30 per cent. of all patients. "Dust-like" cataract when it occurs, is usually associated with this, and is distinguished by extending into the pupillary area in the same layers. Pre-senile changes, as a rule, interfere much more slowly with vision than senile changes.

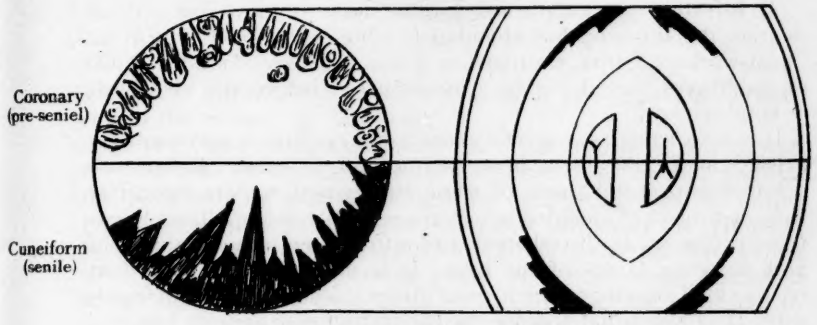

FIG. 3. After Goulden.

The discrimination of the last senile type, cupuliform or saucer-shaped cataract, is a triumph for the slit-lamp, as this is usually the sole means of distinguishing it from other posterior cortical opacities. The cataract, which is usually accompanied by equatorial cuneiform opacities, consists of a dome-shaped area of uniform thickness in the posterior cortex near the capsule. This dome extends to the periphery, but not axially. It is composed of dense, crystalline opacities of no great size, interspersed with rounded vacuoles. As there is no overlying haze, details are clear cut, and a golden lustre, which is even slightly polychromatic, may be seen. It is easy to distinguish it from complicated cataract by considering the above features unless a nuclear cataract is present in addition, in which case it may be very difficult.

(3) Complicated cataract is a progressive condition, and is difficult to describe shortly. The slit-lamp or ophthalmoscope may reveal in the early stages, as the causative condition, retinitis *pigmentosa* or iridocyclitis. A certain number appear to occur in otherwise normal eyes. It is possible, however, that such cases are really senile cupuliform cataracts with exaggerated lustre.

A polychromatic lustre at the posterior zone of specular reflection is the earliest sign of the condition. Faint flaky opacities rendered indefinite by overlying haze, appear in the posterior cortex at the posterior pole gradually taking "rosette" form. The surface of this becomes bread-crumb-like or tufted, and extends forward axially. The lustre becomes obliterated except at the edges which extend slightly outwards. A few coloured crystals and vacuoles are now seen as the opacity advances, and a second opacity appears behind the posterior band of the adult nucleus. The opacity extends gradually until it is complete; shortly before which, it may be distinguished from a complete senile cataract by a polychromatic lustre from the anterior zone of specular reflection.

(4) Infra-red ray cataract is another form of posterior cortical cataract the slit-lamp has elucidated. One type is common to all "heat-workers," iron, tin-plate, or glass. Stoewers found in 2,000 glass-blowers that it hardly ever occurred before the 20th year of employment.

It is not surprising, therefore, that some confusion seems to have existed as to the form heat cataract might take. Robinson's original paper and those of some subsequent writers exemplify this, as forms are included which are probably senile. The characteristic opacity is disc-shaped and situated entirely in the axial and posterior layers of the lens. It is made up of small, flaky or speckled opacities which may glitter. Vacuoles are extremely rare. To the ophthalmoscope the cataractous disc appears irregular and porous, and may be sharply limited towards the periphery. There may even be a circular dark line around it. This is due to the protection of the iris-diaphragm which limits the area of lens exposed to infra-red rays to that of the pupil. The disc spreads forward axially to the centre of the lens. Associated with the earlier stages may be an unduly early diminution of accommodation. Apart from a rupture of the zonular layer of the anterior lens capsule found in 9 out of 32 cases there is nothing specially characteristic about the later stages of the condition. Vogt's experiment showing that ultra-violet sensitive photographic paper is unaffected by rays from a glass furnace at 2,000° C. has ruled out these rays as the causative factor of this lesion.

(5) Traumatic cataracts are of interest in that they may become absorbed in part or completely. The opacity peculiar to trauma is distinctive. It consists of a "rosette," a thin white layer in the posterior cortex, looking like several white crossed feathers, the shafts of which (see Fig. 4) are the lens sutures accentuated by droplets formed between the fibres. The reflex is dead white, without polychromatic or other lustre. When caused by an intra-ocular foreign body, the capsular rent and slightly opaque track may be seen. Where the rent is large, white broken-up fibres and

FIG. 4.

an area of accentuation of the fibre pattern may intervene between it and the remaining clear lens.

When due to indirect violence the "rosette" may be anterior, or posterior, or both, connected in some cases by flat angular opacities running axially through the intervening lens. It is this type due to indirect violence, described originally by Hudson, that sometimes disappears in such an extraordinary manner. When the injury has occurred during youth, the opacity may be buried as age advances, by fresh clear lens. Old opacities are stated to have the sutures, *i.e.*, the shaft of the feather in the centre of the feather (division of rosette). The medico-legal importance of the fact that trauma produces a characteristic lesion in the lens can easily be judged if one imagines oneself faced with an old man with senile lens opacities, who, knocked down by a car, while recovering discovers his vision is not what it was and attributes this to a cataract from the blow.

If a traumatic cataract is complete it may yet be possible to detect signs of trauma to the iris or siderosis bulbi, and thereby determine its origin.

"Electric shock" cataract resembles the traumatic variety morphologically, though there is, in addition, a type with a central, anterior, sub-capsular droplet opacity.

(6) Cataracts due to glandular dyscrasia are of considerable interest to the physician as in some diseases *cf.* dystrophia myotonica, in which they may be the first sign of the disease.

There are two types, the sub-capsular type due to diabetes is distinct from the others. It occurs in young people, aged 20-40 years, who are usually under treatment with insulin, and consists of small cloudy opacities situated anteriorly and posteriorly directly under the lens epithelium, between it and the zone of disjunction. These opacities may resemble droplets, or be grouped in areas

of 0·1 mm. in size. In addition, small coloured corpuscles and clear clefts separating the fibres may be seen. A case of rather similar opacities shown at the Royal Society of Medicine in a healthy young acetone worker raises a point of interest in connection with the aetiology (see Fig. 5).

The cortical type is caused by several diseases. The opacities which are situated more deeply in the lens (in the cortex) are small, flaky, or rounded, but coarser than in diabetes, and are interspersed with many coloured crystals. They vary a little in size and shape

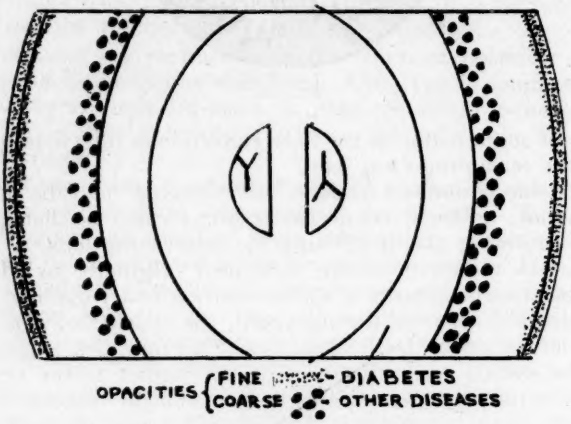

FIG. 5.

according to the disease. In dystrophia myotonica the opacities appear between 20 and 30 years of age, and are small and angular. In cretins, they are small and flaky, in both they are in the superficial layers of the cortex anteriorly and posteriorly. In operative myxoedema, the opacities are flattened, disc-like, bluish and as coarse as in coronary cataract. In mongolian idiots, about 9 years of age, punctate, flaky, and coloured opacities develop in all layers except immediately under the lens capsule and in the embryonic nucleus. Sometimes the opacities are arranged in a disc. Some months to a year after removal of the para-thyroids and the development of post-operative tetany, faint powdery crystalline opacities develop in the cortex of the lens, and tend to arrange themselves in a stellate form in the posterior cortex in some cases. As this type of cataract may also develop in cases of idiopathic tetany where the signs of the causative disease are not prominent, care must be taken in this diagnosis, as a spontaneous hyphaema is liable to occur on the fifth day after extraction.

PARALYTIC ALTERNATING STRABISMUS OF ? CONGENITAL ORIGIN

BY

E. A. SEALE

GRAHAMSTOWN, SOUTH AFRICA

THE case to which these notes and photographs apply, I venture to call a Paralytic Alternating Strabismus of Congenital Origin. Though "alternating" is usually applied to concomitant squints, this action here is a striking feature in the picture. A fairly diligent search through ophthalmic records has failed to yield a similar case.

History.—E. H., female, aged 5½ years, was seen by me on July 7, 1931. She was a healthy looking, well nourished and intelligent child. Her mother said she had been born naturally and was always strong and well. When a few months old, and after a slight accident caused by the fall of a blind on her perambulator, the mother noticed her eyes peculiar. She was taken to a doctor who has been good enough to send me the notes he made at the time, viz., "She fixed with the left eye which showed some lid ptosis, and there was a marked upward and inward deviation of the right eye." Atropine was ordered and the fixing eye to be covered during part of the day.

There was no further medical attendance until, two years later, when she was taken to an eye surgeon in another town. The treatment was similar, but soon after her return home she became very ill: this illness was attributed to atropine poisoning. The drug was stopped and partial covering of the left eye advised. The child was

brought again in a year when no change was ordered but advice was given to return in a couple of years for operation. She was then three years old. After persisting, as directed, until early in 1931, her mother left off the shade entirely as she said it was injuring the good eye which had "gone small."

Her tonsils had been removed in 1929.

Early in the treatment a Wassermann test had proved negative.

On examination, I found each eye could fix equally well, though at a subsequent visit I thought the right fixed the better. When the right eye fixed, the left eye looked in and the left lid drooped. On the left eye fixing, the right eye turned up, and in—the eye being then widely open.

There was also a facial paralysis of the left side extending to tongue and lips; a weakness of the levator of the left lid and a slight deafness on the left side.

R.V. = 6/6. L.V. = 6/6. No diplopia. Under atropine, each eye gave 6/6 and a normal refraction. Pupils evenly dilated. Reaction to light and convergence had not been noted. Occasionally, by stimulus or strong effort, a slight outward deviation was obtained in each eye. Knee jerks active and the Babinski reflex definite but not marked. As syphilis seemed negatived, a congenital nuclear deficiency or an encephalitis was considered. I could find no reason for the latter.

In seeking help to localize the lesion I found abundance of information in the recent work, chiefly that of Leslie Paton and Gordon Holmes.

Obviously the external rectus of each side appears defective, therefore the sixth nerve or its nucleus. For the facial paresis the proximity of the seventh nerve nucleus with its fibres sweeping around the sixth nucleus gives a clue. To account for the levator palpebrae superioris weakness is more difficult, as the nucleus of the third nerve is comparatively distant, but the diagram of the course of the fibres from the sixth nucleus in Parsons's[1] "Diseases of the Eye" shows the connection with the third nerve nucleus. He shows the anterior part of the great large-celled lateral nucleus of the third nerve is the probable source of the levator palpebrae superioris nerve supply.

Whitnall[2] says that though this was the source given by Bernheim, other workers have considered the posterior end of the nucleus as the origin of the fibres to the levator.

The up, and in, deviation of the right eye when the left fixes, indicates a probable involvement of the supply to the superior oblique muscle. The very close proximity of the fourth nerve nucleus to the third establishes touch here.

In trying to account for the defective hearing on the left side, I found guidance in the fine diagrammatic set of coloured plates in Leslie Paton's article "Vestibulo-ocular Reflex Paths."[3] It shows the nucleus triangularis of the eighth nerve, in the floor of the

fourth ventricle giving "some direct fibres to the nucleus of the sixth nerve," which lies closely mesial to it at its proximal end. He also here traces the fibres coming from the nucleus of the descending root and passing into the posterior longitudinal bundles. "In all probability this nucleus forms an important relay on the reflex path, linking up labyrinthine recepts with movements of the eyes and of the limb muscles."[4]

Duke-Elder[5] quoting Kappers (1920) emphasises the "position of the oculo-motor nuclei, with their close anatomical relationship to the posterior longitudinal bundles and vestibular system." The slight outward movements, noted occasionally on effort, might be due to reflex action, a paralysis of movement rather than of muscle; as Gordon Holmes suggests "the lesion responsible for it must involve certain paths converging on the oculo-motor nuclei rather than these nuclei or the nerves that arise from them,"[6] also that such movements may be elicited by labyrinthine stimulation or other means.

One is forced to recognise the outstanding importance of the posterior longitudinal bundles in all ocular palsies. Their value as central relay stations is emphasised by the authorities I have mentioned. In the present state of my knowledge I suggest the sixth nerve nucleus on the right side as the chief seat of the defect in the patient. Unfortunately for a more complete history, she left here for a distant town and, so far, attempts to trace her have failed.

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A CONJUNCTIVAL BAND SIMULATING A PERSISTENT NICTITATING MEMBRANE

BY

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UNDER the heading conjunctival bridges and pouches Herbert describes folds of the conjunctiva in the region of the superior fornix with or without adhesion to the tarsal conjunctiva.

I have come across a few cases showing a condition which does not come under this description, nor do they resemble any of the congenital anomalies of the conjunctiva such as ankyloblepharon or acquired adhesions like symblepharon.

In the case which is pictured in the Figure it will be seen that a fold of the inferior fornix is drawn up and adherent to a small area of the upper tarsal conjunctiva. It was bluish-pink in colour, fan-shaped, with the apex at the attachment to the upper tarsal conjunctiva and the base at the inferior fornix, the borders being crescentic. A few blood vessels ran vertically on its surface like the ribs of a fan. Apart from its location on the outer side of the cornea

it simulated a persistent nictitating membrane. The eyeball was perfectly free underneath the band and rolled in and out without any impediment.

The case depicted represented the fourth of a series of five seen by me, the first, third, fourth and fifth having come directly under my notice and the second belonging to my then colleague in the eye department of the Madura Government Headquarter Hospital.

The mode of formation of this condition was at first a puzzle to me. But sometime after I saw the first case of this kind there came to the clinic a number of cases of acute mucopurulent conjunctivitis, which had been treated with irritants. These cases showed enormous swelling of the eyes with what looked like an everted upper lid in front of the swelling. Under treatment this gradually went down and in the end was seen to be a greatly chemotic lower fornix.

The country treatment for ordinary "sore eyes" ("heat" as it is popularly termed in the local vernacular) is what is called "cutting the heat," *i.e.*, the lower fornix is scarified with the very rough under surface of the pumpkin leaf. This produces the excessive swelling of the lower fornical conjunctiva just described. With a struggling child and lids already swollen as a result of the acute inflammation it can easily be imagined how, when the lower fornix is scarified, a part of the upper tarsal conjunctiva may also be injured. The two

excoriated surfaces then become adherent to each other during healing and thus the band is formed.

The treatment of the condition is, as may be seen, very simple and consists simply of cutting across at the upper tarsal attachment with a pair of scissors. The band then springs back to its original position and, in the course of a few days, smoothens itself out. A little yellow ointment into the eye every morning is all that is required by way of medication.

In conclusion I wish to record my gratitude to Major M. M. Cruickshank, I.M.S., the Superintendent of the hospital, for kindly according sanction for a photograph of the case to be taken.

A NEW ANTERIOR SYNECHIA KNIFE

BY

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IN cases where three-quarters or more of the pupil is incarcerated in a corneal scar and, as a consequence, the anterior chamber to a corresponding extent is very shallow or practically non-existent, I have experienced a great deal of difficulty in insinuating the ordinary instruments recommended for the release operation, like a Graefe's or Herbert's knife or Ziegler's knife-needle, since the sharp point either pierces the cornea or gets entangled in the iris. To obviate this difficulty I use a special knife made for me by Messrs. Down Bros., Ltd., of London, the details of which are clearly shown in the illustration.

An ordinary keratome incision is made at a spot where the anterior chamber is deepest, and of a size slightly larger than the width of the blade of the instrument, with the usual precautions for avoiding loss of aqueous. The instrument is then introduced through the incision until the point is well past the site of adhesion. By either depressing the handle, or by a series of sawing movements, the adhesion is severed. Sometimes the iris is only partly cut through, some of the fibres simply stretching before the instrument without giving way. When this occurs, the instrument is partly withdrawn, pushed past the scar on the opposite side, and again made to cut the iris as before. Being double-edged

the instrument is used with equal facility with either hand, and made to cut in either direction. The point being blunt, as also the edges down to three millimetres from the tip, no damage to the cornea or the iris occurs.

I have operated on more than 15 cases and the instrument has served my purpose extremely well.

ANNOTATION

Vision in Industry

The National Ophthalmic Treatment Board (Industrial Section) has recently issued a leaflet (No. 37) in which the attention of employers is called to the fact that "efficient sight in many industries is probably the most important single factor contributing to high output, good work, diminished casualties, and the well-being and contentment of the workers."

Popular prejudice against spectacles and the idea that those who wear glasses have weak eyes and are therefore inferior to those who do not, has up to the present time militated against the general use of glasses in industry. This leaflet instances under four headings some of the workers for whom glasses are not only useful, but in some cases essential. Many occupations demand fine precision work and abnormally close scrutiny, such as linking in the hosiery trade, filament sorting in the electric industry and "drawing-in" in weaving. Some branches of the "fabric and printing industries demand accurate colour perception," for which a colour-blind person is obviously ill-suited; and no one questions the fact that motor drivers must possess an unrestricted field and good judgment of depth and distance. Again illumination is of the greatest importance in industrial concerns.

"To meet the requirements of industry the Board, with the approval of the British Medical Association, has prepared a scheme for the expert examination of the eyes of workers. Centres throughout the country with approved medical personnel and also for the supply of glasses by approved opticians have been arranged, and a reasonable scale of inclusive charges has been adopted.

"Many employers will no doubt wish to test for themselves the effect of this service upon their output and work upon a limited number of 'controls' before adopting it generally, and the Board will gladly provide the necessary facilities and technical advice." The advantages of such a scheme are self evident, and we hope that employers generally throughout the country will avail themselves of this offer.

COUNCIL OF BRITISH OPHTHALMOLOGISTS

Annual Report

THE Council presents its report for the year 1932-33. At the first meeting the following were elected as officers:—*President*, Mr. J. Herbert Fisher; *Vice-Presidents*, Sir J. Herbert Parsons, Mr. Bernard Cridland; *Hon. Treasurer*, Mr. M. S. Mayou; *Hon. Secretary*, Mr. R. Affleck Greeves. The following were appointed to serve on the Executive Committee: The President and Secretary (*ex officiis*) with Mr. Mayou, Mr. Juler, Mr. Levy, Mr. Williamson-Noble and Mr. Neame.

The Council has to record with great regret the death of its President, Mr. J. Herbert Fisher and that of a past President, Mr. Treacher Collins, both of whom have served as members of the Council since its inception in 1918, and whose loss will indeed be deeply felt.

Mr. J. Herbert Fisher has been President of the Council since 1926, and during these seven years has devoted himself wholeheartedly to its service. His sound judgment, coupled with his great experience in committee work have been of inestimable value and have assisted in very great measure the carrying on of the official work of the Council during his term of office.

Mr. Treacher Collins was President from 1923 to 1926. He always took the deepest interest in all matters connected with the Council and his fertile brain was the source of many suggestions which led to the discussion and investigation of numerous important problems.

With regard to the work of the Council during the past year: The Report on the question of Compensation for Eye Injuries was duly published.

The Council considered the present position as regards the instruction of medical students in the diagnosis, prevention, and treatment of ophthalmia neonatorum, and the L.C.C. were applied to with a view to obtaining their permission for students of the London hospitals to attend St. Margaret's Hospital. This is still under consideration by the L.C.C.

The matter of the regulations concerning ophthalmic diseases in the prospectus of the British Provident Association was dealt with and the amendments suggested were agreed to by this body.

A Sub-Committee was appointed to discuss and report on the question of the qualifications which should be considered necessary to render an ophthalmic surgeon eligible for appointment to the honorary staff of a hospital. This Committee is now at work.

Representatives of the Council have attended the meetings of

the Ophthalmic Committee of the British Medical Association and of the Prevention of Blindness Committee.

The Council desires to thank the Council of the Royal Society of Medicine for the use of its rooms for meetings.

As in former years, the expenses of the Council have been defrayed by contributions from its members.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM

ANNUAL CONGRESS, 1933

THE President Dr. A. H. H. SINCLAIR in opening the Annual Congress of the Ophthalmological Society of the United Kingdom extended a welcome to members of the society and foreign guests. He expressed regret at the loss of those members who had died during the last year and paid particular tribute to the work of Professor Priestley Smith, Mr. A. Freeland Fergus, Mr. Treacher Collins and Mr. J. Herbert Fisher. The President then awarded the Nettleship Prize to Mr. W. S. Duke-Elder for his work on the physiology of the eye.

Mr. FRANK LAW read a paper "On the Present Position of Ultra-violet Therapy in Eye Disease." He referred to the administration of the phototherapeutic department at Moorfields, the need for regular attendance of the patient, supervision and follow-up work. He described the technique of general and local phototherapy; the apparatus employed and the results obtained in the treatment of blepharitis, conjunctivitis, episcleritis, hordeola, corneal ulcers, various forms of keratitis and iridocyclitis. Sir Arnold Lawson, Mr. Davies, Mr. Lindsay Rea and Mr. Goulden took part in the discussion. The latter spoke of the importance of sending cases of phlyctenular conjunctivitis to the nose and throat surgeon for attention to the adenoids and tonsils. Mr. Goulden also stated that the results of ultra-violet treatment in cases of tuberculous iridocyclitis are by no means so disappointing as is generally believed. Persistence in treatment is essential. Tuberculin is of value as a therapeutic adjunct.

Mr. R. FOSTER MOORE read a paper upon "The Value and Technique of the use of Radon in certain Intra-ocular Conditions." He dealt with the selection of the type of case for which radiotherapy was a justifiable procedure; the technique of access and application of the radon and the changes observed as a result of this treatment. He showed illustrations of cases of sarcoma of the choroid, glioma of the retina and angiomatosis retinae treated by radon. He alluded to the possibility of producing, by means

of radon an obliterative endarteritis in cases of recurrent vitreous haemorrhages (Eales' disease).

Mr. H. B. STALLARD followed with a paper on "The Effects of Radium Emanations in certain selected Diseases of the Eye." This paper was illustrated by microphotographs of two cases of sarcoma of the choroid, one of sarcoma of the iris and two of glioma retinae subjected to the interstitial and scleral methods of applying screened radon seeds of various strengths, and in one case the use of an unscreened circular applicator containing 10 mgms. of radium salt was employed. Serial sections of the irradiated material were taken and the zone of effective irradiation carefully measured in each case. A comparison of the different methods of application was made and inferences deduced from these.

Mr. A. D GRIFFITH read a "Report on a Case of Glioma Retinae Treated by Surface Applications of Radium, with Pathological Findings." Radium was used in the form of screened needles embedded in a plaque, the initial dose amounting to 5040 mgm. hours. Most of the neoplasm disappeared except a localised area near the optic disc which contained a few calcareous granules and was believed to be degenerate. Later, recurrence occurred elsewhere in the eye and radiotherapy on this occasion was ineffective. The neoplasm increased and extra-ocular extension took place. Mr. H. Neame suggested that the external application of radium might by preferable, as it avoided disturbance of the malignant cells by the insertion of a seed.

Mrs. P. P. MARTIN read a paper on "The Effect of Irradiation of the Eye." Her work has been done on 34 cases in which the eye was normal but where the orbital adnexa were the site of malignant disease and under radium treatment. She described the effects of such treatment on the lids, conjunctiva, cornea, iris, lens and retina. The paper was admirably illustrated by photographs.

At the afternoon session Dr. IVY MACKENZIE, Dr. SPENCE MEIGHAN and Dr. E. N. POLLOCK read a most interesting paper "On the Projection of the Retinal Quadrants on the Lateral Geniculate Bodies, and the Relationship of the Quadrants to the Optic Radiations." Their material was taken from a patient who had a syphilitic lesion of the geniculate body on one side who committed suicide the day after her visual fields and medical examination had been made. Serial sections were cut from geniculate bodies to the occipital poles and an exhaustive examination of these sections carried out. Some interesting points about the blood supply of the geniculate body and the representation of the lower retinal quadrants on the lateral side and the upper on the mesial side of the geniculate body were discussed.

Sir John Parsons, Mr. Leslie Paton, Dr. Traquair and Dr.

Greenfield expressed their appreciation of this paper and joined in the discussion.

Dr. J. G. GREENFIELD and Dr. S. NEVIN described "The Pathology of a late Infantile Case of Amaurotic Idiocy, with the Macular appearances of Tay-Sachs' Disease." The literature and pathological findings of previous cases were revealed and criticised. The authors of this paper showed some excellent microphotographs which demonstrated that the typical fundus picture of this disease is due to the presence of lipoids and lipoid degeneration in the ganglion cells in the vicinity of the macula. Sir John Parsons, in the discussion that followed, outlined certain definite types of amaurotic idiocy with macular changes. Mr. Leslie Paton also contributed to the discussion.

Dr. J. E. CAUGHEY read a paper on "Cataract in Dystrophia Myotonica." He described the clinical findings, the comparative rarity of this disease, and its heredito-familial nature associated with a decline in family fortunes with each generation as the defects of dystrophia myotonica became added to cataract and then mental deficiency superimposed on these. The slit-lamp appearances of the type of cataract seen in this disease were discussed.

Dr. W. CLARK SOUTER followed with a paper on "A Case of Cataract Extraction in Myotonia Atrophica." He described his investigations of the family history of five generations affected by this disease, and gave an account of the operative technique he employed in the treatment of these cases and the results obtained. Some good photographs and charts accompanied this paper.

Mr. Juler and Mr. Summers spoke of similar cases on which they had operated.

Friday, May 12.

Dr. JOHN MARSHALL and Dr. I. CHESAR MICHAELSON read a paper on "Exudative Retinitis in Children." They described four cases and showed microphotographs of the large swollen 'ghost' cells in the retina and sub-retinal fluid, coagulum in the retina and detachment. They discussed the toxic origin of this disease, its course, histological interpretation and its distinction from that type of exudative retinitis described by Coats.

Mr. Neame and Dr. Spence Meighan joined in the discussion.

Professor REGINALD PUNNETT gave an address entitled "An Ocular Mendelian Puzzle." He described the chromosomal interpretation of sex linked inheritance; the transmission of hereditary disease through female 'conductor' chromosomes; the presence of a sex determining chromosome and a 'deficiency' chromosome in the male. This admirable contribution must be read in full in order to appreciate Professor Punnett's arguments.

Mr. C. H. USHER opened the discussion on "Heredity and Eye Diseases." He showed charts of many pedigrees and spoke of the difficulty in assessing the relative effects of heredity and environment in certain diseases. He discussed those solitary cases of eye disease occurring in unaffected families and the existence of 'carriers.'

Dr. M. VAN DUYSE followed and gave illustrations of hybridation from two varieties, dominant and recessive, in flowers and mice. He described examples of direct and indirect heredity in cases of incest and the consanguineous marriages of cousins. His paper was much appreciated by the society.

Miss JULIA BELL spoke of the Mendelian laws of heredity, their theory, interpretation and the necessity for their modification in certain instances. The mathematical problem of hereditary disease is one of great complexity. The collection of reliable and sufficient clinical data is important, so also is attention to the anomalous pedigree.

Miss IDA MANN described the experimental production of isolated anomalies and hereditary defects by mechanical, thermal, chemical, and irradiational agents and the transmissibility of acquired characters. She demonstrated by means of diagrams and drawings alterations in the structure of unicellular organisms induced by experimental methods. In the case of mammals experimental attempts to produce hereditary eye defects had so far failed. In the case of human beings some interesting results had been obtained by irradiating the pregnant uterus at the third month of foetal life. Epithelial rosettes and other changes significant of arrested development and differentiation of the nuclear layers of the retina were evident on examination of the eyes. Mr. Myles Bickerton and Mr. Leslie Paton spoke in the discussion.

In the afternoon a clinical meeting was held at the Central London Ophthalmic Hospital and cases were shown.

In the evening Dr. H. M. TRAQUAIR read a paper concerning "Two Cases of Recurrent Spasm of the Central Artery of the Retina." He drew attention to the recurrence of the attacks as a point of differentiation from thrombosis and embolism of this artery. The blindness produced by retinal spasm was distinct from that of a scintillating scotoma of migraine, the former being produced by peripheral vascular changes and the latter by alteration in the cerebral circulation.

Mr. L. H. SAVIN read a paper entitled "A Discussion of the Relationship, Direct or Indirect, between certain cases of Herpes Ophthalmicus and Varicella." He gave an account of 18 cases, some of whom had had herpes zoster before varicella, others varicella before herpes zoster, and one had suffered from varicella

and herpes zoster simultaneously. He discussed the nature of the infecting agent, inoculation and immunity experiments. He stated that probably both diseases were caused by modified strains of the same virus. In the discussion that followed Mr. Leslie Paton said that the mode of entry for the infecting agent was along the lymphatics of nerves in the nose and throat in cases of herpes and by the blood stream in cases of varicella.

Mr. R. C. Davenport, Mr. Quick and Dr. Rao gave accounts of cases.

Mr. W. S. DUKE-ELDER read a paper "A factor in the Aetiology of Glaucoma." He confined his remarks to the part played by the vitreous body in cases of chronic glaucoma and the mechanism of a vascular crisis in acute glaucoma. He described with diagrams and charts of drum-tracings certain animal experiments elaborated to produce a vascular crisis. The parts played by histamine and the 'axon reflex' were discussed.

Mr. Williamson-Noble, Mr. Alabaster, Dr. Traquair and Mr. Michaelson joined in the discussion.

Saturday, May 13.

Mr. RIDDELL read a paper on "Coeliac Disease Associated with Night-blindness." He described the diet of this patient which was defective in fats and proteins but not in vitamin A. The diet was corrected and the night-blindness disappeared in 10 days. The patient was unable to absorb fats and had a dislike for meat, the ingestion of which produced certain toxic symptoms. There was no response to cod liver-oil and liver.

Dr. Rao in the discussion that followed this paper described cases of night-blindness due to toxaemia from biliary cirrhosis, chronic diarrhoea, pregnancy, saccharine poisoning, protozoal and parasitic infections.

Mr. C. D. SHAPLAND read a paper on "Endothermy Cauterization for Detachment of the Retina." He described the technique employed at Utrecht and that of Larsson in Stockholm. He gave valuable statistics about the refractive errors, sites and types of retinal tears, complications and results of 133 cases of retinal detachment treated at Moorfields Eye Hospital by the Larsson technique. Messrs. Goulden, Neame, Juler, Whiting and Traquair joined in the discussion.

Mr. AFFLECK GREEVES described a conjunctival suture which he uses in cataract operations before the section is made. The object of the suture is to co-apt the edges of the corneo-scleral section wound, to expedite firm healing, and to minimise astigmatism. It is especially indicated in cases of fluid vitreous, hypermature cataract, subluxated lens, loss of vitreous and where movements are unavoidable such as in cases of rheumatism and chronic bronchitis.

Mr. J. H. DOGGART read a paper on "Ocular Crystals." He gave an account of the history and literature of this subject and described the types of crystals seen in the cornea, anterior chamber, lens, vitreous and retina and their association with certain diseases of the eye. This paper was illustrated by drawings of slit-lamp examinations.

Mr. E. WOLFF contributed a paper on " Relative Ptosis " and described cases where the widening of the palpebral fissure on the opposite side to the relative ptosis was the sign of pathological importance

Mr. J. N. TENNENT reported two cases of carcinoma of the lacrymal sac; in one case the neoplasm originated from the columnar epithelium of the lacrymal sac and in the other the disease arose in the nose and infiltrated the sac. Primary carcinoma of the lacrymal sac is very rare. This paper was illustrated by some good microphotographs.

Museum of Scientific Exhibits

A museum of scientific exhibits was held in the College of Nursing. Macroscopic and microscopic specimens of pathological interest were on view. Among the other exhibits were a series of composite slit-lamp drawings made from living animals in the London Zoo; drawings of abnormalities of the iris; a collection of antique instruments;; the strabismoscope; the orthoptoscope; instruments of historic interest; and rubber occluder spectacles for squinters.

Theodore Hamblin, Ltd., were good enough to undertake the structural arrangements for this museum.

Trade Exhibition

A trade exhibition was held in the College of Nursing and many instruments of interest were shown and demonstrated. The following firms had stands:—T. Bowing & Co., Ltd.; Clifford Brown, Ltd.; Clement Clarke, Ltd.; Curry & Paxton, Ltd.; C. W. Dixey & Son; Down Bros., Ltd.; Theodore Hamblin, Ltd.; Alfred Hawes & Son; C. Davis Keeler; H. K. Lewis & Co., Ltd.; Pankhurst & Barrett; Rayner & Keeler, Ltd.; Uni-Lux Optical Co.; John Weiss & Son, Ltd.; Carl Zeiss & Co., Ltd.

The Annual Dinner was held on Thursday May 11, at the Langham Hotel, the President, Dr. A. H. H. Sinclair being in the chair.

Members of the society and their friends visited the Zoological Society's Gardens, Whipsnade Park on Saturday afternoon May 13.

H. B. STALLARD.

ABSTRACTS

I.—LENS

(1) Lewis, Park (Buffalo).—Cataract in fresh-water fish, caused by parasitic invasion of the crystalline lens. (La cataracte chez les poissons d'eau douce comme résultat de l'invasion parasitaire du cristallin). *Arch. d'Ophtal.*, December, 1931.

(1) This paper presented to the International Association for the Prevention of Blindness, concerns a subject of interest, which, since its earliest investigation many years ago, has failed to attract attention.

In 1831, Professor von Nordmann found in the eyes of fish live larvae of trematode worms; lamelliform organisms with suckers and other characteristic features. A curious point noted by von Nordmann was that although these entozoa were found in almost all the organs of the fish, they exhibited a marked preference for the crystalline lens, in which they were sometimes present in hundreds, causing obvious opacity of the lenses. In instances in which the invasion of the tissues generally was excessive, death of the fish ensued. They had apparently a predilection for the trout, but attacked many varieties of freshwater fish.

von Nordmann described the characters of these parasites minutely and zoologists associate his name with that of this particular variety—*diplostomum volvens*. The publication of his researches (in the *Microsc. Beitr. d. Naturgesch.*) excited much interest, and his observations were confirmed by other investigators. The presence of these larvae in the lenses of fish was noted so frequently that it became customary to consider the lens of fresh-water fish as their natural habitat, and the subject ceased to excite interest.

Writing ten years later, Steenstrup completed the list of fish the lenses of which were invaded by the diplostomum. The presence of these larval entozoa in the deep and least accessible structures of certain living creatures might have remained a simple biological curiosity, but for the fact that some well-credited observers recorded instances in which this trematode larva had been found in the lens of the human eye. Geschiedt discovered eight specimens of monostoma in the cataractous lens of an aged female; the parasites were in the superficial layers and were "about" 1/10 of a millimetre in length. In 1883 four larvae of distoma were found in the congenital cataract of a child of five months; they were in the cortex of the lens. This child lived in a district in which trematoda abounded. Greeff exhibited two dead and shrivelled larvae of trematodes in a unilateral cataract obtained during

a post-mortem examination on a fisherman. These are the only cases on record.

Kraemer (Graefe-Saemisch Handbuch) expressed doubt concerning these observations; in his opinion it is *a priori* unlikely that the lens, avascular and with feeble nutritive processes, and enveloped in a thick capsule, should be the primary seat of entozoa. Lewis points out that Kraemer's objections would apply equally to the crystalline lenses of fish, in which, without the sign of a breach in the capsule hundreds of living diplostomata find their way into the substance of the lens.

Lewis was invited by the Director of the Science Museum in his town, to examine some rainbow trout, brought to the aquarium, of which a large proportion were the subject of cataract. More than 300 specimens of 11 varieties of fresh-water fish were obtained and examined. In the eyes of all varieties diplostomes were found, often in large numbers. The varieties and numbers of fish and the percentages in which the lenses contained larvae are set forth in tabular form. In four varieties 100 per cent. showed infected lenses. The specimens shown on the screen by the author when reading his essay and illustrated in the *Arch. d'Ophtal.* are those of *diplostomulum gigas*.

The evolution of this trematode is interesting. The eggs are deposited in the intestinal canal of aquatic birds, often the seagull or wild duck. Eliminated with the excreta of the birds, the eggs fall into the water, which being isotonic or nearly so, leads to rupture of the envelope of the egg. From the egg emerges a *miracidium, i.e.*, the ciliated form of the larva, which being mobile penetrates the tissues of a certain variety of snail. In the body of the snail, eggs are deposited afresh, and from these emerge cercaria or metacercaria, larval forms which differ widely from the miracidia. These cercaria, which swim by means of their bifurcated tails, penetrate the body of the fish. They do so over its whole surface, except where protected by cartilaginous plates or scales, and extensive invasion kills the fish. They are found in all the soft tissues, but after an interval of six days, only in the eyes, and chiefly in the lenses.

Examination of the eves of affected fish by the ophthalmoscope and slit-lamp, revealed in many instances opacities in the posterior cortical zone; with oblique illumination an undulatory movement in the opaque areas could be perceived. In other cases the whole lens was opaque and the fish blind.

Kraemer failed to find these parasites in some hundreds of human lenses. It must be remembered, however, that these entozoa in the form of almost transparent lamellae easily escape detection; the eye of the observer must be trained to recognize them, and they should be sought especially in countries in which

trematoda are abundant. Given these conditions it seems probable that many examples of parasitic cataract will be added to the small group of three already published.

Many other points of interest in this paper will be found by readers of the original, but further space cannot be given to it.

J. B. LAWFORD.

(2) **Vancea, P. (Cluj, Roumania).—Spontaneous absorption of Cataract. (De la résorption spontanée de la cataracte).** *Arch. d'Ophtal.*, February, 1932.

(2) Spontaneous absorption of cataract, as is well known, is uncommon, but there is no reliable evidence as to its relative frequency. Vancea has found records of 63 examples, and allowing for some undiscovered cases he suggests that the total cannot exceed 70 or 80. One of the earliest cases, occurring in a medical man, was recorded by von Szily in 1884.

von Reuss, who collected reports of 33 cases, noted that in half of them the condition was not one of simple cataract. In several instances there was a history of glaucomatous attacks and in a large proportion the existence of other congenital defects such as remains of pupillary membrane and malformations of the iris, had been noted. Histological examination has been made in a few instances; in one by Paparcone, the lens capsule was unbroken, but the anterior epithelium was completely absent.

Vancea has had two cases under observation and gives clinical notes with illustrations of them. In both instances the cataract was congenital; in one it was unilateral, in the other bilateral, but very unequal, the better eye having vision of 5/10 with a −7·0 D. lens. The worse eye in which partial absorption occurred, obtained vision of 1/40, with a +4·0 D. lens.

In searching for an explanation of the absorption of the cataractous lens, and from a thorough examination of his patients, the author suggests a functional hyperactivity of the pancreas. Experiment has shown that naphthalin-cataract follows lessened pancreatic function, and that insulin accelerates the absorption of cataract so produced.

A valuable bibliography accompanies the paper.

J. B. LAWFORD.

(3) **Holm, Ejler (Copenhagen)—Some cases of false lenticonus in children.** *Acta Ophthal.*, Vol. X, p. 327, 1932.

(3) Cases of false lenticonus showing a different central refraction from that of the periphery have been recorded only in old people, Holm briefly reviews the condition and reports three cases in

children, aged 2, 11 and 8 years respectively. In the second case a rudimentary, and in the third a pronounced lamellar cataract was present; none was present in the first, whose father, however, was thus affected, and it is possible that in this child the present appearance is the beginning of cataract. Holm holds that many of the cases previously reported as posterior lenticonus are probably cases of this nature.

ARNOLD SORSBY.

(4) **Frenkel, H. (Toulouse).—Ring cataract of Vossius. A critical study. (Sur la cataracte annulaire de Vossius. Étude critique).** *Arch. d'Ophtal.*, July, 1932.

(4) In 1904 Vossius first described the transitory annular opacity on the anterior surface of the lens following a contusion of the globe, which is now known by his name.

The annular opacity which becomes visible a few days after the injury, is brownish in colour as seen by oblique illumination; its diameter is 3mm., corresponding to that of a normal pupil.

Vossius held (and his view was generally accepted by subsequent writers) that as a result of pressure of the iris against the anterior capsule, the pupillary border affixed this ring upon the lens like the impression of a seal; that this was brought about by (1) desquamation and adhesion of the pigmented epithelium, (2) degenerative changes in the capsular epithelium and fibres of the lens. The lesions disappeared in 2 to 4 weeks.

The clinical features of the disorder are not in dispute, but considerable diversity of opinion is evident in the literature concerning the nature of the visible changes and the mechanism of their production. **Frenkel** has contributed to this literature in communications dealing with the "Syndrome of trauma of the anterior segment of the globe." He now returns to the subject, and under the heading "Mechanism of the changes in the anterior segment of the globe following contusions," he gives critical consideration to some of the theories. The "classic theory" as described by Wagenmann in Graefe-Saemisch is not in consonance with the author's conception of the traumatic syndrome referred to above. He rejects the view that the signs observable in such cases can be explained by a force acting from before backwards. "It is not the iris which is pressed against the lens but the lens against the iris." The starting point of the action of the blow upon the eye is not from a wide area of the cornea, but especially from its periphery. Moreover, the zonule is not as extensible as the earlier writers believed. It is precisely the vulnerability of the zonule which should be considered as the starting point of the series of changes which supervene.

In Frenkel's opinion, these changes are best explained by sub-

luxation of the lens with partial rupture of the zonule, generally at its lental insertion, exceptionally at the ciliary. The lens, partially freed, is pushed at first backwards and often laterally also; when the compression ceases, it presses forwards again distending the iris-diaphragm and frequently causing ruptures in the iris. A variable amount of hyphaema occurs. Desquamation of the posterior epithelial layer of the iris with deposit of the pigment on the lens capsule follows; this pigment is usually persistent. In many instances a small rent is produced in the lens capsule, either anterior or posterior; this allows penetration of aqueous leading to swelling of some fibres of the lens, and partial stationary cataract. When transitory, as described by Vossius, no rupture of the capsule has occurred. The author's arguments in favour of his hypothesis are given at some length, and should be read in the original. A valuable bibliography is appended.

J. B. LAWFORD.

(5) **Clapp, C. A. (Baltimore).—The effect of X-ray and radium radiations upon the crystalline lens.** *Amer. Jl. of Ophthal.*, p. 1,039, November, 1932.

(5) Clapp reviews the literature and experimental work in connection with cataract produced by X-rays and radium radiations. The changes occur first in the lens cortex at the posterior pole. Clinical notes of 23 cases of cataract following X-rays to the lids, orbit, nose and cheeks are given and the latent period before lens changes were evident seems to vary between nine months and eight years.

Clapp quotes Peter's experimental work with radium on rabbits' lenses. Lens changes occurred after doses of 160 to 640 milligram-hours and the latent period was found to be 90 to 260 days. Nothing definite has been determined as to the manner in which these opacities are produced.

H. B. STALLARD.

(6) **Peter, L. (Zürich).—Studies on experimental Röntgen- and radium cataract. (Studien zur experimentellen Röntgen- und Radiumkatarakt).** *Arch. f. Ophthal.*, Vol. CXXV, p. 428.

(6) Much experimental work has been done on the effect of X-rays on the lens and many clinical observations after the use of X-rays for therapeutic purposes in man have been recorded, both experimentally and clinically; the results obtained after Röntgen and radium irradiation have often been negative. Such negative findings, it is claimed, are due to the too short period of observation or to the disease in the eye being so far advanced that the lens could not be examined.

Peter exposed the eyes of a series of rabbits to X-rays and radium, and in all cases found changes in the lens provided they were kept under observation for a sufficiently long period; this latent period is put down, as a minimum, at over five months for even the smallest doses of X-rays or radium.

It is in this long latent period, as well as in its later development, that this type of cataract differs essentially from Vogt's infra-red cataract (which develops very soon after irradiation and remains stationary).

For the detection of these lens changes slit-lamp microscopy is all important, it is more valuable than histological examination.

The lens opacities were first seen in the axial area of the cortex and more posteriorly than anteriorly, while the nucleus in most cases showed no change.

The opacity is probably due to a disturbance in the vitality and ultimate death of the lens fibres in this area by the irradiation.

In the majority of the cases the zone of opacity was moved from its original subcapsular position by the formation of fresh clear lens fibres, as occurs in infra-red and lamellar cataract.

The question as to how far these observations on rabbits are applicable to man is not discussed.

THOS. SNOWBALL.

(7) **Nordmann, J.** (Strasbourg).—**The susceptibility of the crystalline lens to X-rays. (La sensibilité du cristallin aux rayons X).** *Arch. d'Ophtal.*, August, 1931.

(7) The case, reported by **Nordmann**, is a rather startling example of the deleterious effect of X-rays on the crystalline lens, and as such deserves notice. The writer refers to several previous observations on this subject, but the material part of his paper concerns his own case.

A boy, aged 8 years, was brought to hospital in September, 1930; failure of sight had been obvious for some months, especially in school work.

In each eye there were identical changes in the lens. Two illustrations from a bio-microscopic examination are given, and show lesions corresponding closely with the type of cataract known to result from exposure to X-rays, which has been fully described by Rollet, Elschnig and others.

Three and a half years previously the child had been taken to a dermatological clinic to be treated for microsporon infection of the scalp. The records show that one application of X-rays was made to the scalp, a filter of 5/10 mm. aluminium being employed, and the eyes well protected by a thick covering of leaded caoutchouc.

The effect of the treatment was not completely successful; it is noteworthy that when seen by Nordmann the skin and hair of the

orbital region were normal. This, and the fact that the eyes were so well guarded, renders it almost certain that the rays reached the lenses by penetration of the skull, probably in the temporal region.

J. B. LAWFORD.

(8) **Goldmann, Hans (Bern).—Critical and experimental researches on the so-called infra-red cataract of rabbits and fire cataract. (Kritische und experimentelle Untersuchungen ueber den sogennannten Ultrarotstar der Kaninchen und den Feuerstar).** *Arch. f. Ophthal.*, Vol. CXXV, p. 313.

(8) In this lengthy article Goldmann deals with the problem of the infra-red cataract, as produced in rabbits by Vogt, and its relation to the slowly developing fire (*i.e.*, glassblower's) cataract in man, which the latter writer regards as an infra-red cataract.

A critical review of the literature of the subject leads the author to the opinion that no recorded case of experimental infra-red cataract gives any proof that the lens changes are produced by direct action of the rays.

His own experiments go to prove that except through overheating of the iris, it is impossible to produce Vogt's infra-red cataract. Lenses in living pigmented eyes when exposed (without interposing the iris) to the rays show no changes, though marked changes in the fundus occur; but as soon as the iris is also irradiated, lens opacities appear. Vogt's cataract, produced in rabbits, can therefore not be explained as the result of the direct action of the rays on the lens, but only as that of the contact of the overheated iris on the lens.

The development of cataract can be prevented by free irrigation of the cornea with solutions of a low temperature.

There is no proof that fire cataract is due to the direct action of rays, but the author puts forward the hypothesis that it is the result of long continued action of heat, the iris acting as the main transmitter of heat to the lens.

THOS. SNOWBALL.

II.—MISCELLANEOUS

(1) **Ohler and Hurwitz (Boston, U.S.A.).—Spontaneous sub-arachnoid haemorrhage.** *Jl. Amer. Med. Assoc.*, May 28, 1932.

(1) There is no condition in medicine that is more dramatic, more sudden, than sub-arachnoid haemorrhage. The patient is usually perfectly well until the sudden onset of headache. This

strikes so suddenly and so intensely that some patients have described it as though struck at the base of the skull. Vomiting, dizziness and coma may supervene in quick succession.

Of the 24 cases reported by **Ohler** and **Hurwitz**, 21 were brought into the hospital either in coma or in a stuporous condition. Of the 11 stuporous patients, four died and seven recovered. Of the ten in deep coma, eight died and two recovered.

Vomiting is a frequent symptom and was present in nine of the cases. Of the 24 patients 17 could be roused. All but three of the 22 patients examined for stiff neck had this symptom. Stiff neck occurs early in the disease and is due to meningeal irritation. It is so constant that its presence in any patient should bring up the possibility of sub-arachnoid haemorrhage. The stiff neck may be mild at first and increase later. The Kernig sign is frequently present and is due to meningeal irritation.

None of the cases showed bleeding into the eye. This is the result of ruptured basal aneurysm; according to the authors the blood is forced down from the cranial cavity through the lamina cribrosa. In the five cases of ruptured basal aneurysm reported by Riddoch and Goulden in the *Brit. Jl. of Ophthal.* of May, 1925, this sign was present in four of them. But Riddoch and Goulden, as the result of pathological examination of one case, found the haemorrhage to be due to obstruction of the central vein of the retina at the point where it leaves the optic nerve and enters the sub-dural sheath, the method of production of the haemorrhage being the same as that for the causation of papilloedema due to increased intracranial pressure.

The average age of Ohler and Hurwitz's patients was 50 years; the youngest was 17 years old.

There were only five autopsies made. In none of these cases was an aneurysm found,

The deciding diagnostic factor in cases of sub-arachnoid haemorrhage is the presence of blood in the cerebrospinal fluid.

The treatment consisted in daily lumbar puncture until the spinal fluid pressure remained normal, and sedatives, ice-caps and the like for the headache.

A review of an article by Adie, published in the *Lancet* for August 2, 1930, appeared in the *Brit. Jl. of Ophthal.*, Vol. XV, p. 346, on the subject of sub-arachnoid haemorrhage, to which attention may be drawn. "The symptoms and history of sub-arachnoid haemorrhage and of congenital aneurysm shows how similar the history of sub-arachnoid haemorrhage is to that of patients with a long history of migraine and epilepsy. Adie concludes that there is an intimate relation between migraine and spontaneous sub-arachnoid haemorrhage and that some recurrent disturbance of the cerebral circulation whose nature is at present unknown, may in a minor

form, manifest itself in symptoms for which migraine and epilepsy are convenient labels and, in major form, lead to infarction of the cerebral cortex or haemorrhage into the sub-arachnoid space."

A. F. MACCALLAN.

(2) Favory, Albert (Paris).—Haemorrhage in the sheath of the optic nerve. (Hémorragie des gaines du nerf optique. *Arch. d'Ophtal.*, February, 1931.

(2) Haemorrhage in the sheath of the optic nerve was the subject of much discussion and observation some years ago; it has received but little attention of late. Among the reasons for this neglect the author notes the difficulty of diagnosis during life, and the great rarity of post-mortem records in cases in which ophthalmoscopic examination has been made.

In this paper **Favory** gives the subject full consideration. He includes notes of five cases (three under his own observation) in which the diagnosis of intra-vaginal haemorrhage was made after ophthalmoscopic examination, but unconfirmed by anatomical examination.

Symptomatology. The ophthalmoscopic signs which have gained general acceptance are, peripapillary retinal oedema of rapid onset, extending outwards towards the macula, which de Wecker considers a sign of great value: papillary stasis, which some writers state is indistinguishable from the papilloedema of excessive intracranial pressure: narrowing of the arteries and dilatation of the veins, but without complete interruption of the blood stream: flame-shaped haemorrhages in the retina, and occasionally extensive extravasation of blood which breaks through the limiting membrane and spreads in the vitreous. Abadie has described a ring of haemorrhage around the papilla.

Lowering of visual acuity is usually sudden and severe; it may be preceded by transient failure. Loss of all perception of light is not infrequent. The field of vision shows very variable defect.

Modifications of the pupillary reflexes run parallel to the defect of vision. In some instances of total loss of vision, while the direct pupillary reflex is abolished, consensual reflex is retained.

In cases in which the retrogression of changes can be observed, it is found that the oedema of the retina or papilla disappears rather rapidly; the papilla soon becomes white and atrophic, the arteries shrink but the veins usually retain a nearly normal calibre. In the opinion of some observers the late formation of a pigmented ring round the disc has a real diagnostic value.

Much has been written concerning the diagnosis between embolism of the central retinal artery and haemorrhage in the optic nerve

sheath, and the general opinion seems to be that while the ophthalmoscopic signs are often identical differential signs are but seldom very obvious, and other indications must be sought. Haemorrhage in the nerve sheath is very uncommon and should be one of the last causes to be invoked to explain a retinal oedema, with changes in the vessels and rapid lost of sight. Gonin points out that haemorrhage in the nerve sheath is always consecutive to other haemorrhage, cerebral or meningeal. Anatomical examination in 24 cases of sudden blindness with retinal ischaemia failed to reveal a single instance of intra-vaginal haemorrhage: in 20 cases obliteration of the lumen of the artery by embolism or thrombosis was found; in the other four cases the cause was undiscovered.

Aetiology. It seems almost certain that haemorrhage in the optic nerve sheath is never primary. Gonin holds that, almost invariably, its origin is extra-orbital, the blood reaching the vaginal space from extravasation in the meninges, whether of traumatic or non-traumatic origin. Post-mortem examinations have shown that meningeal haemorrhage resulting from trauma, as also that occurring in albuminuria, diabetes, etc., is sometimes accompanied by blood in the sheaths of the optic nerves.

Favory describes two chief aetiological groups: (1) Intra-vaginal haematoma associated with intracranial haemorrhage of traumatic origin, (2) haematoma in meningeal haemorrhage due to disease. One of his cases (an aviator who crashed) is an example of the first group and one falls into the second.

The anatomical relations of the nerve sheath and the meningeal space which permit the extension of blood from the latter, are minutely described. Then follow the author's views concerning the pathogenesis of the ophthalmoscopic, and especially of the pupillary signs: this part of the paper should be read in the original.

A brief bibliography is appended.

J. B. LAWFORD.

(5) **Biozzi and Favia.—A case of diphtheritic ophthalmia neonatorum. (Difterite oculare in neonato contratta in travaglio di parto).** *Boll. d'Ocul.*, July, 1931.

(5) Diphtheritic conjunctivitis of the new-born is very rare; the authors state that in no previous case has the seat of infection been proved; here it was found that the vaginal discharge of the mother contained a virulent form of the Bac: diphtheriticus though it had given rise in her to no symptoms excepting slight burning in micturition for some days before parturition.

HAROLD GRIMSDALE.

BOOK NOTICES

Studies in the History of Ophthalmology in England prior to the Year 1800. By R. RUTSON JAMES. Pp. x+255. Cambridge University Press for *The British Journal of Ophthalmology*. 1933. Price, 15s.

In this handsome volume Mr. James collects and enlarges various historical papers which he has published from time to time and adds others on a number of subjects. Whether he is dealing with the stamps with which the Roman oculists marked their prescribed remedies (Mr. James makes the suggestion that the stamp was impressed on the surface of the ointment) or with the leechdoms and wortcunnings of the Anglo-Saxons, or with the later regular and irregular practitioners whose activities form the subject of the major part of the volume, Mr. James contrives to make the dry bones live.

Mr. James "always likes to think that the shade 'of woad' of, *e.g.*, the Brigantes in the north may have been different from that of the Iceni in East Anglia and from that of Silures on the Welsh March." It is a fact of the present day that the tribes living about Oxford and Winchester, *i.e.*, both north and south of Silchester (which was the headquarters of the Atrebates) cultivate the original shade of woad, while the tribes dwelling in the fen region about Cambridge formerly inhabited by the Iceni, prefer a much lighter shade.

The Middle Ages were generally devoid of brilliant scientists, but England produced one in Roger Bacon, and Mr. James tells us of a second and perhaps greater in his teacher Grosseteste. Bacon's work, based as all good work must be, on experiment, was not recognised properly because his contemporaries were not educated to receive it. Between his time (the thirteenth century) and the eighteenth century the story of ophthalmology has no great name. For the most part its practice was in the hands of irregular practitioners. With the eighteenth century matters improved. In the final papers which are by the late George Coats and are reprinted from the Moorfields Reports, we have a picture of one of the last and perhaps the greatest charlatan whom England ever nursed, the Chevalier Taylor, and his less famous and perhaps less dangerous son. These, no less than the papers which Mr. James has collected, deserved republication in a form more accessible than the periodical in which they first saw light, and the reviewer wishes to express his thanks for a most readable and interesting volume.

The publishers are to be congratulated upon their share of the book.

La Tuberculose de l'Iris et du Corps Ciliare. By HENRI LAGRANGE. Four pages of coloured plates, and 16 pages of black and white plates. G. Doin and Cie, Editeurs à Paris. Price, 200 francs.

Professor J. B. S. Haldane, in a short story entitled: "The Gold-Makers," states that "the French remain beautifully oblivious to a lot of work done outside France until everyone says French science is going to the dogs" . . . "at which period some profound and original discovery is made, such as radio-activity or wave mechanics." A more satisfactory refutation of the first part of this statement could hardly be imagined than the volume under review. In it one is taken, so to speak, on a tour round the various schools of ophthalmology with a kindly critic at one's elbow. Lagrange's views are not tainted with partisanship, and after reading his book one feels that the vast literature on tuberculosis of the iris and ciliary body has been successfully correlated, though there is still much which has to be discovered.

The volume consists of three "books," entitled respectively: general condition; diagnosis with an addendum on experimental pathological work, and an atlas of 20 plates some in colour, all beautifully reproduced. The first book is principally histological and describes many interesting cases. The second book contains a good account of the various tests for tuberculosis, all of which are subject to the same criticism, namely, that a very large percentage of otherwise normal human beings have some focus of tuberculous infection. Even the finding of tubercle bacilli in the blood is not conclusive evidence of the nature of an eye infection because, using Löwenstein's technique, two French observers found them in the blood of patients suffering from such diverse diseases as ordinary pneumonia, streptococcal septicaemia and meningo-coccal meningitis. The most reliable test is probably the occurrence of a general reaction in association with a local allergic one in the eye, after the injection of tuberculin.

In the third book the author is largely concerned with differential diagnosis between tuberculosis and syphilis, and he wisely counsels his readers, when in doubt, to give their first thoughts to the latter disease.

Henri Lagrange is to be congratulated upon having performed a signal service to ophthalmology in producing this very useful survey of an important branch of eye work.

Le biastigmatisme dans la pratique. By M. MARQUEZ and T. BUSTO. Second edition. Pp. 55. Madrid. 1933.

The authors' research on thousands of cases of astigmatism has led them and others associated with this work, to recognize the condition which they term bi-astigmatism.

A brief historical survey of astigmatism is given in Chapter 1, and a tribute paid to Young who discovered it in 1801, and to Airy, the Cambridge astronomer, in 1827 who was the first to use a cylindrical lens. There is an appreciation of the work of Donders, Knapp and Javal.

The authors recommend that astigmatic measurements of the anterior surface of the cornea be made by the Javal-Schiötz ophthalmometer and the total refraction of the eye estimated by skiascopy and subjective methods. They stress the importance of using the ophthalmometer in routine refraction work and in particular its value in the estimation of astigmatism.

Chapter 4, consisting of 31 pages, is devoted to a series of tables showing the values of sphero-cylinders resulting from the bicylindrical combinations from 0·12 cyl. to 6 cyl. with axes varying from 0° to 90°. The formula on which the reference tables are based is given.

Chapter 2 describes the method of employing these tables, and Chapter 3 gives some practical examples of the diagnosis of bi-astigmatism and the use of the tables in such cases.

This work is a monument to the authors' careful and painstaking investigations, which are particularly evident in the thorough manner in which the tables have been compiled.

Nineteenth Annual Report for the Ophthalmic Section, Department of Public Health, Egypt, 1931. Government Press, Cairo.

In the year under review there were 35 specially-built ophthalmic hospitals and 14 travelling hospitals under canvas at work in Egypt. In this country it has always been possible to perform operations for patients with trichiasis-entropion as out-patients, and 73,401 operations for this condition were carried out during the year, a truly enormous work. However, there are 1,162 beds available for cataracts, glaucomas, corneal ulcers and other conditions. The number of extractions of senile cataract was 1,616. The number of cases of primary glaucoma seen was 5,817, of which 2,123 were subjected to some form of decompression operation.

The statistics of blindness, that is according to Trousseau's definition, inability to count fingers at a distance of one metre, show that this has been diminishing from 19.2 per cent. in 1911 to 7.3 per cent. in 1931. This is a very important and gratifying result for the Egyptian authorities. To give praise to where it is due it is necessary to mention some names. The first is that of His Majesty Fouad who has always taken the greatest interest in the ophthalmic welfare of his country. The second is the Under-Secretary of the Department of Public Health, His

Excellency Shaheen Pacha, under whose supreme direction the ophthalmic organisation rests, while the Director of the Hospitals, Dr. I. H. Bey Maziny carries on with admirable zeal the traditions to which he succeeded.

CORRESPONDENCE

To the Editors of THE BRITISH JOURNAL OF OPHTHALMOLOGY.

DEAR SIRS,—A form of Certification of the Blind has recently come into use. It covers four foolscap pages, and it is probable that every practising ophthalmic surgeon must have met this form. It contains very numerous questions in a laudable endeavour to collect information which will furnish the basis for statistics as to the relative frequency of the causes of blindness.

I have three serious criticisms against this form. (1) In a large number of cases the certifying surgeon is quite ignorant of the previous history of the case he is asked to certify, and is so unable to give the information required. (2) It would take a very long examination—extending over some days—if the questions asked are to be properly answered. (The alternative being "Don't know.") (3) Assuming that previous knowledge of the case were available, statistics collected in this method would be very misleading for this one reason—that they would be based only on cases where both eyes were blind, leaving out of count the far more numerous cases with one blind eye. It is evident that these cases must be included.

I suggest that certification should be restricted to the simple statement that the person is or is not blind within the meaning of the Act. This would safeguard the Societies for the Care of the Blind against imposition.

As regards the collection of information, we have the precedent of notification. It could be enacted that blindness occurring in any one eye should be notified by the surgeon under whose care the patient happened to be at the time that the eye was deemed to have become blind. The form for such notification should be carefully drafted, special care being taken to make it as simple as is consistent with obtaining the desired information.

Yours truly,

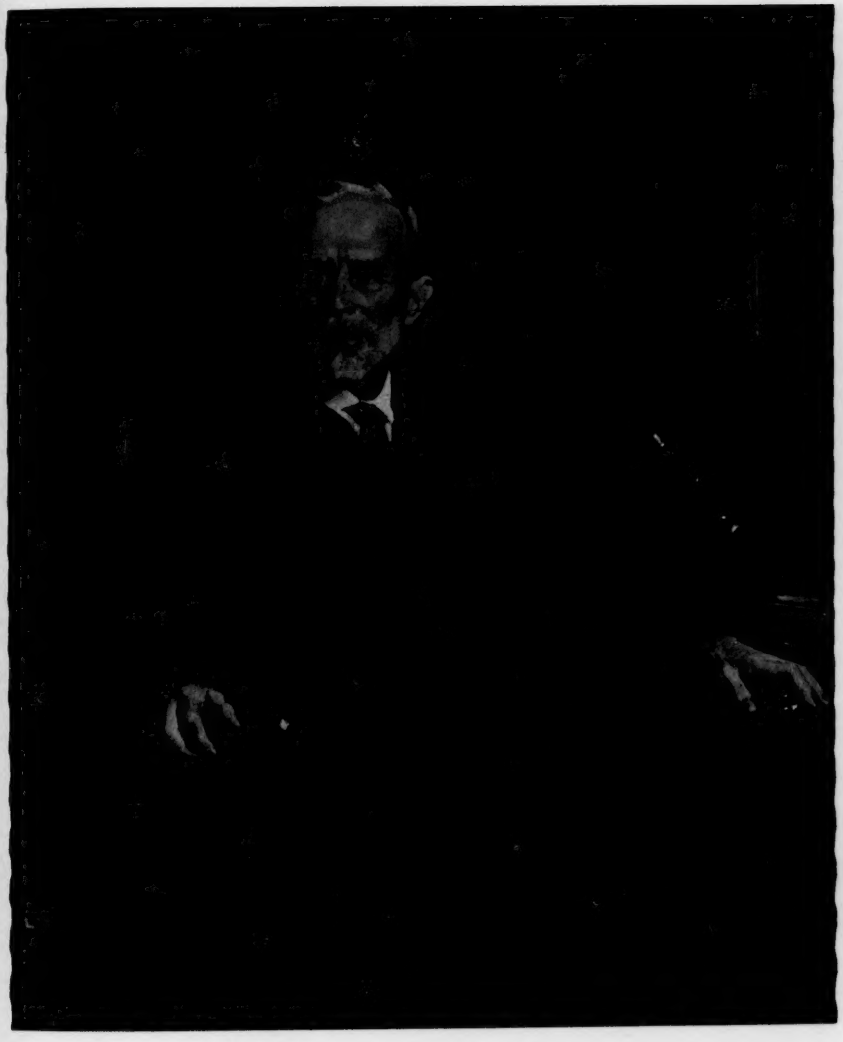
ARTHUR ZORAB.

OBITUARY

PRIESTLEY SMITH, LL.D., F.R.C.S.,

Emeritus Professor of Ophthalmology in the University of Birmingham

THE Birmingham Medical School lost one of its most distinguished members when Professor Priestley Smith died on April 30, in his eighty-eighth year. He was the son of Mr. Brooke Smith of Birmingham and was born on October 29, 1845. During his early youth he served an apprenticeship in mechanical engineering, and for four years pursued this avocation. This training was of undoubted value to him in after years, for the skill which he displayed in contriving appliances for his researches was always noteworthy. Fortunately for humanity, he decided at the age of twenty-one to abandon engineering and to apply his talents to the study of medicine. His student days were spent at the Sydenham College and at the Queen's Hospital, Birmingham, and at the latter institution he was dresser to that famous surgeon Mr. Samuel Gamgee. His studies were interrupted in 1870, by the outbreak of the Franco-German war: in this campaign he volunteered for hospital work and was appointed a dresser, under the Red Cross, to a field hospital in Cologne, serving in that capacity until the termination of hostilities. Returning to Birmingham he completed his medical studies and in 1871 obtained the M.R.C.S. diploma. The scientific possibilities of ophthalmology then so appealed to him that from that time onwards he devoted himself to this branch of medicine. His first appointment was as house-surgeon to the Birmingham and Midland Eye Hospital, where he stayed for two years: he then spent some months as clinical assistant at Moorfields, and was evidently so well thought of that in 1874, a comparatively short time after qualifying, he was appointed Ophthalmic Surgeon to the Queen's Hospital, Birmingham, a post which he held for thirty years. He then began that assiduous and intensive research into clinical and scientific ophthalmology which continued to absorb his interest until the commencement of his last illness, and brought him world-wide fame. It is difficult to convey to those who did not know him intimately, the immense interest and wonderful concentration he applied to his work. He possessed that lucid, logical type of brain which enabled him to sort out essentials and discard unproved ideas. By accurate and constant experiments, he would only accept facts which he could prove to his own satisfaction. His teaching exemplified his clear judgment and was always



PRIESTLEY SMITH (1845–1933)

reproduced from a photo of the portrait by Harold Speed

practical and to the point. When he became lecturer in ophthalmology to the Queen's Faculty of Medicine in 1895, and later in 1900 Professor of the subject, his course of lectures was always regarded as one of the most valuable in the medical school. He carried out an enormous amount of experimental research in the most brilliant manner, and this was undertaken without a thought of self-interest or advertisement, but purely in a scientific spirit. But the value of his contributions to ophthalmology could not fail but bring to him those honours which were afterwards so liberally bestowed on him. An episode which bears witness to his modest and retiring disposition, occurred on his retirement from the active staff of the Queen's Hospital. On that occasion several of his former hospital residents, considering that the usual, somewhat formal ceremony of the Hospital General Committee, was scarcely adequate to honour the illustrious officer they were losing, arranged a dinner and presentation, shared in by all his former house-surgeons. This was naturally a very enthusiastic gathering, and many were the eulogistic speeches uttered, but Mr. Priestley Smith besought us not to allow any of the proceedings to appear in the Press. This we consented to, much to our regret, as we wished the public fully to appreciate how distinguished was their fellow-townsman.

Amongst the numerous distinctions conferred on him were the following:—

In 1878—The Jacksonian Prize of the Royal College of Surgeons of England, for his treatise on the "Causes, Symptoms, Pathology and Treatment of Glaucoma."

1881—He founded the *Ophthalmic Review*, of which Karl Grossmann and himself were the first editors.

1887—Vice-President of the Section of Ophthalmology at the annual meeting of the British Medical Association.

1888—At Heidelberg he opened the discussion on the "Aetiology and Treatment of Glaucoma."

1889—He was appointed Erasmus Wilson Lecturer at the Royal College of Surgeons.

1890—He received the Middlemore Prize of the British Medical Association.

1892—He was President of the Section of Ophthalmology at the annual meeting of the British Medical Association.

1898—He delivered the Bowman Lecture, on convergent strabismus.

1901—He became an honorary Fellow of the Royal College of Surgeons of England, and also had conferred on him by the Birmingham University the degrees M.Sc. M.B. B.Ch.

In 1901—The Royal and Imperial Society of Vienna made him an honorary member, an unusual honour to be conferred on a foreigner.

1904—He received the Nettleship Gold Medal, the first of the series.

1905—He became President of the Ophthalmological Society.

1906—The honorary Fellowship of the Royal College of Surgeons of Ireland was conferred on him.

1914-1916—President of the Section of Ophthalmology, Royal Society of Medicine.

1916—On his retirement from active practice the University of Birmingham conferred the honorary degree of LL.D.

1927—The Lucian Howe Medal was awarded him by the American Ophthalmological Society and was personally presented to him at Birmingham by Dr. Wilder, of Chicago, a very high honour, only previously bestowed on three occasions.

1928—He was presented with his portrait, a very life-like oil painting by Harold Speed. The presentation took place at the Queen's Hospital and Mr. Priestley Smith generously offered to the Governors of the Hospital the gift of the portrait, which offer was accepted and the picture now hangs in the Hospital Board-room.

1932—The Gullstrand Gold Medal of the Swedish Medical Society.

In addition to his numerous publications be contributed to Norris and Oliver's "System of Diseases of the Eye," the Section on Glaucoma.

This long list of honours which fell to him, demonstrates the high opinion in which he was held by widely separated centres of medical science, and is not the least in excess of his deserts. His long life was devoted to his work, and even until within a few months of his death, he continued to experiment and seek new discoveries in the science of ophthalmology.

As regards his personal character, I can speak from intimate knowledge after many years of association with him: he was a man of the greatest integrity who never swerved from his ideals of honour and justice. His love of truth pervaded not only his medical work but also his mode of life in general, to an unusual extent. His life was of inestimable value to the science of ophthalmology and equally so as an example of upright and honourable conduct.

WILFRID ALLPORT.

Mr. J. B. Lawford writes:—

Priestley Smith's professional reputation is assured and no words of mine can add to its lustre: his scientific work and attainments are known and highly esteemed by ophthalmologists all over the world.

For many years I have had the privilege of a close and intimate friendship with Priestley Smith, and in these few lines I desire to pay homage to his memory, more from the personal than from the professional aspect, though I share to the full the admiration and appreciation of all his colleagues towards his life-work.

Priestley Smith was one of nature's favoured sons. With an enviable intellectual heredity, he possessed an array of talent such as is seldom met with in one individual. He had a good knowledge of music, was an accomplished water-colour artist, and his expert and rapid drawing of diagrams on a blackboard was a delight to his audiences. He was also a good linguist. His inventive faculty was highly developed and had he continued his career as an engineer would almost certainly have led to important results. His oratorical powers will be remembered by many, and his services on platforms were in frequent demand. Whatever his theme, professional or otherwise, he was a fluent and singularly attractive speaker.

Withal Priestley Smith was a modest and unassuming man, of great personal charm; singularly open-minded and candid. His intellection, to employ an exceptional but descriptive term, was broad and rapid; by reason of a well-balanced mind his opinions on almost any subject were sound and trustworthy, and when necessary were maintained with dignity and firmness.

For many years he struggled cheerfully against a troublesome physical disability which interfered with the use of his hands, first the right, then the left. Here his inventive genius helped him and he produced various mechanical devices, which for a time enabled him to carry on sketching and other pursuits in which he delighted.

It is now no secret that many years ago the suggestion was made that Priestley Smith should come to London, but he turned it down without hesitation. He was a loyal and devoted citizen of Birmingham, and in addition to his professional relations there, took a keen and practical interest in all that pertained to the advancement of the city and the improvement of its amenities.

With the aid of a secretary he continued his interest in ophthalmological matters and his work thereon until a few weeks before his death, and when I saw him last, some months ago, he questioned me about recent work and literature with the mental zest of a young man.

In his death British Ophthalmology has lost one of its finest and most erudite representatives.

NOTES

Honours

IN the list of Birthday honours we are pleased to see the names of Mr. W. Stewart Duke-Elder, on whom a knighthood has been conferred, and of Lieut.-Col. Duggan, I.M.S., who receives the C.I.E.

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Royal Society of Medicine, Section of Ophthalmology

THE following Officers and Council for 1933-1934, have been nominated: *President:* A. C. Hudson; *Immediate Past-President:* E. W. Brewerton; *Vice-Presidents:* J. Burdon-Cooper, R. Foster Moore, T. Harrison Butler, B. Cridland, C. B. Goulden, R. Affleck Greeves; *Honorary Secretaries:* J. D. Magor Cardell, A. Rugg-Gunn; *Other Members of Council: Physicians:* T. Grainger Stewart, C. C. Worster-Drought, Anthony Feiling; *Metropolitan Members:* A. D. Griffith, H. B. Stallard, G. G. Penman, P. G. Doyne, F. T. Ridley, J. H. Doggart, O. Gayer Morgan, E. Wolft; *Provincial Members:* E. V. Oulton, A. E. Iles, T. Snowball; *Representative on Library Committee* (*Honorary Librarian of the Bowman Library*): F. A. Williamson-Noble; *Representative on Editorial Committee:* Robert C. Davenport.

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Corrigendum

WE regret a misprint in the paper by Prof. A. Fuchs, p. 209, "where 0·1 c.c. of a 10 per cent. solution of bichloride of mercury" should read 0·1 c.c. of a one *pro mille* solution.

FUTURE ARRANGEMENTS

1933

July 5-8.—Oxford Ophthalmological Congress, at Oxford.

October 6.—Midland Ophthalmological Society, Annual Meeting, at Birmingham and Midland Eye Hospital.

December 5.—Midland Ophthalmological Society, at Birmingham and Midland Eye Hospital.

CONTEMPORARY OPHTHALMIC LITERATURE

American Journal of Ophthalmology. *May, 1933.*

BARRAQUER. Accidents and complications occurring in the intracapsular extraction of senile cataracts.
SANYAL. Epidemic superficial keratitis.
LUCKIESH and MOSS. Size of pupil as a possible index of ocular fatigue.
CLAPP. Additional experiments verifying the presence of treponema pallidum in the cornea in experimental interstitial keratitis.
BERENS. International visual standards for aviators.
BARKAN. Ocular complications in a case of agranulocytic angina.
THYGESON. Inoculation of the human conjunctiva with trachomatous material.
JACKSON. Vision for equilibrium and orientation.
EVANS. The scotometry of retinal oedema.
BAHN. The eyes of some famous historical characters.

Archives of Ophthalmology. *May, 1933.*

VERHOEFF and KING. Leptotrichosis conjunctivae (Parinaud's conjunctivitis): artificial cultivation of the leptotriches in three of four cases.
O'BRIEN and PORTER. Glaucoma and naevus flammeus.
GLOBUS. Tumours affecting the optic chiasm and optic tracts: a brief critical survey of their clinical and anatomic features.
GORDON. Ophthalmology in the Bible and in the Talmud.
HOLLOWAY. Leber's di ease.
KRONFELD. Anterior chamber punctures in relation to intra-ocular tension.

Archives d'Ophtalmologie. *May, 1933.*

DUVERGER. Lagrange's operation. Surgical treatment of glaucoma.
GONIN. My experiences with electro-coagulation in retinal detachment.
VILLARD and DUJEAN. Lacrymal adenoma.
CAUSSÉ. Demonstration of the contrary deviation of the eyes by means of Struycken's apparatus.

Revue d'Oto-Neuro-Ophtalmologie. *March, 1933.*

FARNARIER. Traumatic endophthalmitis caused by nerve lesions.
PROBY. Vaso-motor syndrome of the labyrinth.

Revue d'Optique. *January, 1933.*

BRUHAT and CHATELAIN. Essay en photo-electric polarimetry.
LAPORTE. On a law of emission of electro-luminescent tubes applied to several problems of photometry.

February, 1933.

VAN HEEL. The construction of spectrographs of great luminosity.
BUISSON, JAUSSERAN and ROUARD. The transparence of low atmosphere.

March, 1933.

BLONDEL. Methods of measuring the brilliance of the surface of light-house apparatus.
DUBOULOZ. Utilisation of photo-electric cellules covered with flourescent substances as receivers in ultra-violet. Study of the curve of sensibility.

Klinische Monatsblätter für Augenheilkunde. *May, 1933.*

GROENOUW. Nodular corneal opacity transmitted through four generations.
THIEL. On the clinical signs and treatment of pituitary tumours.
JAENSCH. Malignant tumours in the form of chalazia. Epithelioma and sarcoma of the lids.

V. SZILY. Dystrophia epithelialis lentis adiposa.
HERZAU. Squint amblyopia and its treatment.
ROESE. A case of divergence paralysis.
HARTLIEB. Critical consideration of the question of megalophthalmos.
KAYSER. Normal sized globe behind megalocornea.
MÜLLER and FRANCHESHETTI. The influence of the illumination intensity on the fundus through various red-free filters and their significance for the ophthalmoscopy of red-free light.
MANS. On the question of pigment after cataract.
SCHAPPERT-KIMMIJSER. Recurrent corneal erosion and familial corneal degeneration.

Annali di Ottalmologia e Clinica Oculistica. *December, 1932.*

ZANETTIN. The chromatic sense with indirect vision.
PUSCARIU. Observations on a rare case of ocular syphilis.
CORRADO. Contribution to the genesis of palpebral psoriasis following the repeated instillation of atropine.

Archivio di Ottalmologia. *February, 1933.*

TRISTAINO. Ocular phenomena following the heating and cooling of the superior cervical ganglion.

Rassegna Italiana d'Ottalmologia. *January-February, 1933.*

ALAJMO. The effect of histamine on normal and glaucomatous eyes.
DENTI. Syndrome of the nasal nerve.
LUGLI. Ocular lesions from experimental avitaminosis A.
CORDERO. Glutination in the normal and cataractous lens.
VELE. Ambard's constant in senile cataract.
LUMBROSO. Clinical and histological contribution to the knowledge of tumours of the plica semilunaris.
BARATTA. The effect of treponi leucocitari on the cicatrization of corneal wounds.
FILIPPI-GABARDI. On a particular congenital malformation type of proliferation of the papilla and retina.

Revista de Ophtalmologia. *March, 1933.*

REZENDE. The actual state of the cataract operation.
TUPINAMBA. Modification of the technique of conjunctival repair.
RABELLO. Oculists, ancient and modern.
ALVARO. Prevention of blindness.

Archivos de Oftalmología Hispano-Americanos. *May, 1933.*

ARJONA. Ocular changes due to cranio-facial dystrophy.
ARRUGA. Aetiology and pathogenesis of retinal detachment.
ABADIA. Ought Fukala-Vacher's operation to be re-established?

Revista Cubana de Oto-Neuro-Oftalmiatria.

March-April, 1933.

ALONSO. Traumatic lesion in the cortical centre of vision. Anatomical and physiological considerations.
CASTRESANA and GUINEA. Indirect scleral rupture with sub-conjunctival luxation of the lens of both eyes, produced by the same traumatic agent.
CEPERO and COMAS. The treatment of hordeolum.
——— Our technique in the application of medical ophthalmic diathermy.
ESTEBAN. Ocular changes of hepatic origin.